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# Alert: *Keeping Mosquito-Transmitted Diseases from Bugging AL Residents*

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**W**ith summer in full force, assisted living residents take to the outdoors for walks, picnics with family and friends, and other activities. However, this summertime fun is not without risk; and mosquitoes are one source of potential problems.

It's true; mosquitoes are more than just annoying little pests that leave red bumps and a nasty itch. These insects can cause illness and serious disease for AL seniors. Fortunately, awareness of the risk from mosquito exposure can help facilities protect their residents.

## **Mosquito Disease: Not Just for the Tropics Anymore**

Mosquitos, particularly females, actually create a fluid exchange during their "bites." When the mosquito sucks blood, she replaces it with fluid from her salivary glands. Unfortunately, viruses and parasites from previous bites are mixed in this salivary fluid, passing the viruses and parasites to the next subject. Humans, birds, and horses have become ill from mosquito bites. While malaria is the parasitic disease best known to use this route of transmission, West Nile Virus and Dengue fevers also are communicated in this way. In recent years, these diseases have presented a growing health problem in this country.

## **Putting Teeth into Diagnosis of Bite-Related Illnesses**

ALF residents are at high risk for



acquiring infections, and they generally respond slower to invading viruses or parasites. However, changes in physiology that come with aging, along with the multiple illnesses and comorbidities, can make it challenging to detect mosquito-related illnesses until they become more advanced.

One challenge is that older people's daily temperature is lower than younger adults; therefore, fevers may be more difficult to detect. At the same time, poor peripheral circulation makes their hands and feet cooler; so surface flushing or warm touch will not necessarily be an indicator of fever. So, clearly, it is important not to count on temperature—or lack of a fever—alone to rule out a mosquito-related or other disease.

Seniors also have reduced sensa-

tion; they may not feel a mosquito bite. While it may be useful for clinicians to ask about mosquito bites during an exam or conversation, again, this should not be the sole means of identifying—or ruling out—a mosquito-transmitted disease. At the same time, residents may not report pain or discomfort from a mosquito bite. This is partly due to reduced sensation.

Another challenge in identifying these illnesses is that chronic conditions and accompanying medication regimens may mask signs and symptoms. For example, chest pain may be attributed to heart angina when the pain source actually is a respiratory infection. Additionally, elderly residents often have mental capacities that are altered due to chronic disease—such as dementia or Alzheimer's

disease—or medication side effects. So mental changes related to an illness may be more subtle or more difficult to identify as being caused by mosquito-transmitted illness.

Finally, weight loss is a constant challenge with some elderly people; new episodes of refusing to eat, or vomiting or diarrhea may indicate an infection or illness.

Screening or monitoring residents who have any indications of illness starts with staff that is knowledgeable about individuals' normal reactions or behaviors. It is useful to consider changes in responses to events (eg, going to the dining room, or bathroom), the weather, the menu (eg, suddenly complaining about food they previously enjoyed), or familiar people. Such changes may suggest a new disease process such as a mosquito-transmitted illness. Facility staff should notify the resident's physician about changes that may facilitate

professional determination of cause and prescription of diagnostic testing and/or supportive therapeutic measures (ie, antipyretic, fluid levels, antibiotics, or antivirals).

While diagnosis can be tricky, it is important to detect mosquito-related illness promptly. Complications following a viral fever can

include bacterial infections, dehydration, and disruption of chronic condition management.

### Signs Bugging Residents May Not Be Flu

When a resident develops one of these mosquito-borne illnesses, early signs and symptoms will be flu-like in nature. However, blood tests will be necessary to confirm a diagnosis and identify the specific virus or parasite in the resident's blood. Table 1 outlines a few of the discriminating characteristics of the common mosquito-borne illnesses. While mortality rates are low, it is important to note that most deaths occur in the very young and the elderly.

There are immunizations against some viruses such as Yellow fever; and antibiotics treat bacterial infections and parasite infestations. Immunity to viral fevers either from immunization or disease may last for

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**Table 1. Mosquito-Borne Illnesses**

Disease name	Incubation*	Common signs	Duration**	Cure/Mortality
West Nile Virus (Virus)	2 to 14 days	<ul style="list-style-type: none"> <li>• Fever</li> <li>• Headache</li> <li>• Fatigue</li> </ul> Occasionally: <ul style="list-style-type: none"> <li>• Skin rash on trunk</li> <li>• Swollen lymph nodes</li> <li>• Eye pain</li> </ul>	3 to 6 days	Mortality 3.5% in USA 2004
Dengue Fever (Virus)	3 to 14 days	<ul style="list-style-type: none"> <li>• High fever</li> <li>• Severe frontal headache</li> <li>• Joint and muscle pain</li> </ul> May have: <ul style="list-style-type: none"> <li>• Nausea, vomiting and rash</li> <li>• Hypotension (frequent complication)</li> </ul>	3-5 days rarely more than 7 days	Mortality 5%
Yellow Fever (Virus) (Vaccination to prevent)	7-10 days	<ul style="list-style-type: none"> <li>• Sudden onset fever/chills</li> <li>• Headache</li> <li>• Backache</li> <li>• Generalized muscle pain</li> <li>• Nausea and vomiting</li> </ul>	Usually less than 7 days	Less than 20%; few cases in USA
Malaria (parasites)	7 to 30 days, or longer if preventative medications taken	<ul style="list-style-type: none"> <li>• Cycle of fever, chills, sweats</li> <li>• Headaches</li> <li>• Muscle pains</li> <li>• Nausea and vomiting</li> </ul>	Lasts 6-10 hours and repeats every second or third day	Curable with medications

\*Incubation period is the time for the viruses to develop into disease from bite to early signs.

\*\*Duration is the common length of the illness. Common signs, duration and incubation time periods vary with individuals.

Source: Adapted from information posted on <http://www.cdc.gov>; Control of Communicable Diseases Manual (David Heymann, Ed.).

several years, preventing relapses or re-infection with West Nile Viruses, Dengue, and Yellow fever. Therefore, many people living in areas with high infection rates may have immunity due to previous disease. Without immunity from exposure, however, elderly people will become ill.

Residents' primary care providers (PCPs) should direct responses for these fevers on an individualized basis. Malaria is the only mosquito fever with a treatment; major concern is the loss of red blood cells due to bacterial destruction. In elderly people already anemic due to chronic conditions and poorer absorption of nutrients, the additional loss of blood may be serious. Prophylactic treatment may include chloroquine hydrochloride or primaquine phosphate. The latter is not recommended for people with rheumatoid arthritis or lupus erythematosus or for those taking bone marrow depressants or hemolytic drugs. Chloroquine hydrochloride may increase the toxicity of monoamine oxidase inhibitors (MAOIs), and antacids decrease absorption.

Unsupervised use of over-the-counter drugs to treat signs and symptoms can be harmful. Aspirin used to reduce fever poses problems with gastric irritation and loss of blood, increasing the effects of anticoagulant and antiplatelet aggregation therapy, decreasing effects of beta-blockers and ACE inhibitors, and adding to the ulcerogenic effects of chronic condition medications (eg, corticosteroids, anti-rheumatics, and NSAIDs). Long-term use of acetaminophen may cause liver damage; toxicity is more likely with cardiac and pulmonary disease patients. Acetaminophen does have interactions with some diuretics and isoniazid.

Antacids taken to reduce nausea and vomiting may reduce gastrointestinal absorption of prescription medications. Some antiemetics are contraindicated for persons with glaucoma in addition to problems with anticholinergic responses (for example: dry mouth with subse-

quent constipation). Electrolytes in oral rehydration fluids should be monitored as many elderly residents are maintained on low sodium intake regimes; these fluids generally have high sodium contents.<sup>1</sup>

Ensurance of therapeutic levels of drugs (prescription and non-prescription) and preventing drug-to-drug interactions are a time consuming part of resident care provided by PCPs and other practitioners. Knowledge of the resident's medical history may prompt his or her PCP to order

### **Prevention is the best and most effective way to address mosquito-transmitted illnesses.**

prophylactic antibiotics, additional fluids, or care routine changes (ie, take temperature or bath more frequently). Communication early in any change of behavior or health will facilitate appropriate medical responses.

Comfort measures include offering clear fluids, using cool cloths to help reduce heat of fevers, changing the bed sheets frequently, or providing assistance with bathing, showering, and grooming activities. Family members or supportive friends can provide bedside assistance during the height of the infection or help out by bringing special foods or running errands.

#### **Preventive Measures: Cheap and Effective**

The best and most effective way to address mosquito-transmitted illnesses is to prevent them.<sup>2</sup> Toward this end, it is important to educate residents about the value of wearing long sleeves and long pants when they are outside at dawn and during early evenings and nights.

The use of insect repellants also

should be encouraged. The Centers for Disease Control and Prevention (CDC) recently expanded the list of acceptable insect repellants. These can contain DEET, Picaridin, or oil of lemon eucalyptus.<sup>3</sup> Posting a list of repellants in a common area at the ALF may be useful. Working with a local pharmacy to offer samples of or discounts on repellants also may help encourage residents' use of these products.

Of course, there are many steps residents should take to promote healthy responses to any illness. These include increasing fruit and vegetable intake as part of a balanced diet, drinking plenty of fluids, increasing exercise activities, taking a daily multivitamin, and getting adequate sleep.

#### **Batten Down the Hatches: Keeping Mosquitoes Out**

Environmental interventions that can prevent contact with mosquitoes can be implemented easily. The most common environmental recommendations from the CDC are:

- Screen windows and doors (do a thorough monthly surveillance; replace or repair holes or openings).
- Drain or fill in low lying ground areas that collect water—playground sand can be used effectively.
- Trim plants to reduce humid covered areas close to the ground for mosquito habitation.
- Cover or dispose of containers, tires, plastic pools—anything that holds standing water.
- Keep mosquito-eating fish in ponds or fountains to eat the mosquito larva (some sanitation department provide them for permanent ponds or fountain).
- Apply larvicides to water surfaces to suffocate or kill the mosquito larva.

ALFs should contact their local sanitation departments for information about community spraying or other mosquito control efforts being implemented. It is wise to avoid

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**ALFs and PACE:  
A Synergy of Missions**  
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The relationship between TLC and its ALF partners is very synergistic and interactive. TLC often assesses participants and determines that they can no longer reside in an independent setting. At this time, the site asks ALFs to evaluate these individuals to determine whether the facilities can meet participant needs in partnership with TLC. Other times, the ALF sees that their participant needs more assistance than it can provide—especially regarding the coordination of medical care—and refers the resident to TLC. Some ALFs have used this relationship as a marketing strategy.

The ALF plays a critical role in the success that TLC has achieved in terms of meeting its goal of enabling participants to maintain community residence. TLC understands the challenges, needs, and limitations of the assisted living setting, so the site makes it a priority to communicate plans of care and treatment changes quickly and clearly to the facility. TLC team members know that most ALFs have limited, if any, nursing personnel and have their own regulations with which they need to comply. Therefore, the site works daily to balance its actions with the facility's needs and concerns—with residents' best interest always as a priority.

Communication between TLC and the ALFs also is essential. The site facilitates open and prompt communication so that its team can work with ALF staff to agree on the optimal care of participants when an urgent medical problem arises. This care could include an emergency room visit, a home health nursing visit, or transportation to the ADHC for urgent evaluation by

the center's physician.

As with all relationships, periodic problems happen. TLC has found that the best resolution always arises from close and constant contact between the PACE center and the ALF manager. Most issues involve communication problems. For example, the two sometimes will arrive at different assessments regarding resident needs, ie, one program believes that ALF is an appropriate care setting for a specific individual and the other does not.

Such situations require a meeting to review each side's assessment to ensure that all the relevant information is shared. Most commonly, a face-to-face meeting and detailed review

of the individual's specific medical information results in a decision. However, there are times when a consensus cannot be reached. When this happens, the participant may have to choose between remaining with TLC or staying in the ALF; or TLC would have to find a different ALF, provide more services to that ALF, or place the participant in a nursing home.

**PACE and ALFs:  
Happily Ever After?**

While PACE is not a panacea, it offers a practical and innovative option for senior care. At the same time, PACE and ALFs increasingly are enjoying partnerships that enable residents to age in place and continue to call the facility home as their frailty increases and they require more services and higher levels of care.

ALC

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*See [www.npaonline.org](http://www.npaonline.org) for a list of existing PACE sites and PACE sites in the developing phase. More details on TLC can be found at [www.totallongtermcare.org](http://www.totallongtermcare.org).*

**PACE offers a practical and innovative option for senior care.**

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outside activities when spraying is expected. It is important to ensure that all outside areas are sprayed and that extra efforts are taken for special outdoor events. Of course, public safety needs to be addressed and all protective measures implemented to shield residents and staff from exposure to sprays and pesticides.

**Triumvirate of Management Responsibilities**

Facility management responsibilities are three fold. First, a manager should be in contact with the Public Health Department on a regular basis. Weekly and monthly reports that can be mailed or accessed online identify communicable diseases in your area (see the *CDC: Morbidity and Mortality Weekly Report* at <http://www.cdc.gov/mmwr> or your state health department's morbidity reports). Additionally, there are a number of publications that can help educate staff about prevention mechanisms or particular diseases.

Second, management must address residents' health status. This calls for staff education that ensures that everyone knows what signs and symptoms to watch for that may suggest a resident has been bitten by a mosquito and/or has a mosquito-transmitted illness. It also calls for communication with residents and family members about these illnesses and how to prevent them.

The third responsibility is to educate staff. Inservice programs can address prevention techniques, how to monitor resident behavior, and maintaining personal health. Professional staff should request information about resident behavior to ensure that appropriate monitoring is happening and that non-licensed staff are reporting what they have observed. In addition to inservice programs, it is important

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to offer information in a variety of formats—including posters, fliers, and online resources.

It is appropriate to keep a travel log for both residents and staff that lists places visited—particularly areas endemic with mosquito-borne diseases, dates of travel, and names of travelers. Some fevers develop days or weeks after initiation bites, by which time the traveler is away from the area and he or she may forget about or neglect to mention the trip to a clinician. The log will enable residents' primary care providers to learn about the potential relationship between travel and illness, even if the resident doesn't mention it.

## Conclusion

Mosquitoes may be small, but they can carry big illnesses and create tremendous problems in AL communities. While mortality from these diseases is low, the death rate among elderly individuals is high. There are means of treating mosquito-transmitted illnesses, but prevention is the best way for facilities to address them. The efforts a facility expends to control mosquitoes and protect residents and staff from these pests are well worth the time, money, and energy invested if they prevent just one illness or death. **ALC**

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## References

1. Spratto G, Woods A. 2005 Edition *PDR Nurse's Drug Handbook*. Clifton Park, NY: Thompson Delmar Learning 2005.
2. Eliopoulos C. *Gerontological Nursing*. (6th ed.) Philadelphia, PA: Lippincott, Williams, & Wilkins 2005.
3. Centers for Disease Control and Prevention. (2005). CDC adopts new repellent guidance for upcoming mosquito season. (Available at: <http://www.cdc.gov/od/oc/media/pressure1/r050428.htm>)

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