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recreators on summits and trails to prevent damage to these plants.

### **More Data Required**

As climate change continues, we will undoubtedly see more erratic weather patterns with more extreme events. Total rain and snowfall, evaporation rates, cloud cover, and temperature patterns will continue to be affected. Flora and fauna will be impacted. Behaviors may be changing right now. But we can't accurately say how. Long-term projected impacts of global warming on Adirondack alpine zones remain undetermined due to a lack of data. More study is needed to measure change as it happens to make reliable predictions and plan for the future.

Summit stewards play a critical part in this type of research. Often seen by the public as "those nice people," or mistaken for rangers, summit stewards are part of the larger scientific community, studying botany and changes in alpine plant populations. While they are engaging alpine zone visitors on ways to reduce impacts on alpine vegetation, they are also conducting research and undertaking recovery projects. They share findings and best practices with their peers in pursuit of information critical to protecting the wonders of alpine zones. (Read more, pages 20 and 26.) ▲

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## **AdironDoc**

# Norovirus

by Dr. Tom Welch

**This issue's column** discusses a rather unpleasant ailment that has been in the news quite a bit lately. Norovirus is the most common cause of gastroenteritis (an inflammation of the gastrointestinal tract resulting in nausea, diarrhea, and vomiting) in the United States. The condition is named for Norwalk, Ohio, where the first outbreak was described. (Seems like a rather unfortunate thing

for which to immortalize a town!) It was once called "winter vomiting disease" because of a (variable) seasonal pattern and the marked vomiting that characterizes it. The disorder is extremely contagious, with only a few particles of the virus capable of infecting an individual. Norovirus has a very short incubation period, often less than a day or two, so it can spread with incredible rapidity through a population. Although the condition is short-lived (mercifully only twelve to sixty hours), it can render patients miserable while it is active.

Like most gastrointestinal infections, the greatest danger of norovirus infection is dehydration. This accounts for most of the 200,000 annual worldwide deaths from the virus. Other causes of gastroenteritis such as cholera and rotavirus are more likely to cause death, but norovirus is far more common than either of these. The typically short duration of the illness is probably the reason that severe disease is uncommon.

As is the case with most gastrointestinal infections, the virus spreads when one ingests fecal particles from infected individuals. Yup. You read that right. How does this happen? Not surprisingly, sloppy hygiene is the typical culprit. Infected individuals may leave microscopic traces of fecal material on their hands after using the restroom, and then transfer these to surfaces or, if they are involved in food preparation, into food. Since only a few particles of virus are needed to cause infection, the disease spreads when others touch contaminated sur-

faces or consume contaminated food. Some viral particles are shed by patients for several days after symptoms have cleared, so even "well" persons can spread the disease.

Outbreaks of norovirus are most common in closed settings; these environments simply provide more opportunities for interaction between infected and healthy individuals. Thus, the infection has disrupted cruise ships, nursing homes, restaurants, schools, and similar spots. Contaminated water rarely plays a role in norovirus transmission; when it does, it is most likely consequent to plumbing issues which lead to cross-contamination of potable water with waste.

What are the implications of all this for the backpacker/camper? Actually, although folks seem to love to focus on giardiasis, a relatively uncommon cause of wilderness-related illness, there are scores of reports of norovirus outbreaks among outdoor recreationists. Most recently these have involved rafting groups on the Colorado River. And, in case you were wondering, drinking contaminated river water was not involved in these outbreaks, which impacted specific groups of rafters, not everyone using the river. Surface contamination of equipment and shared supplies were to blame, just as on cruise ships. Closer to home, data from New York's state health department show that gastroenteritis including norovirus is the most common reportable illness among summer campers in the state.

Once the infection has hit, there is precious little to do beyond gearing

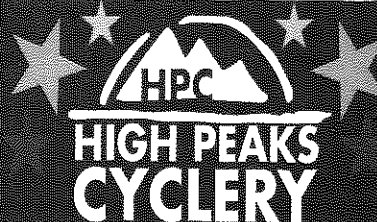
*Data from New York state's health department show that gastroenteritis including norovirus is the most common reportable illness among summer campers in the state.*

up for an uncomfortable day or two. Maintaining fluid balance by drinking is obviously important, but the severe vomiting of norovirus may make that challenging. Take small sips, at least an hour or more after vomiting. Diarrheal medications such as loperamide (Imodium®) are not likely to be useful. There are reasonably effective anti-emetic ("vomit stopping") medications such as ondansetron (Zofran®), but these are available only by prescription.

Prevention is the key, and is amazingly simple: keep your hands clean! Although alcohol-based sanitizers are convenient, they really don't address the main problem: hands contaminated with microscopic bits of infected debris. For that, there is no substitute for a good lathering with plain soap and water. Such practice is most critical after defecation and prior to any food handling. The environmental impact of pure soap, used at a distance from any water source, is nil. ▲

*Tom Welch, MD, is a physician at Upstate Medical University in Syracuse and an active member of the Wilderness Medical Society. He is a licensed professional guide, and a certifying instructor for the Wilderness Education Association, and has guided groups in the Adirondacks, Montana, and Alaska. More information is available at his website and blog, [www.adirondoc.com](http://www.adirondoc.com).*

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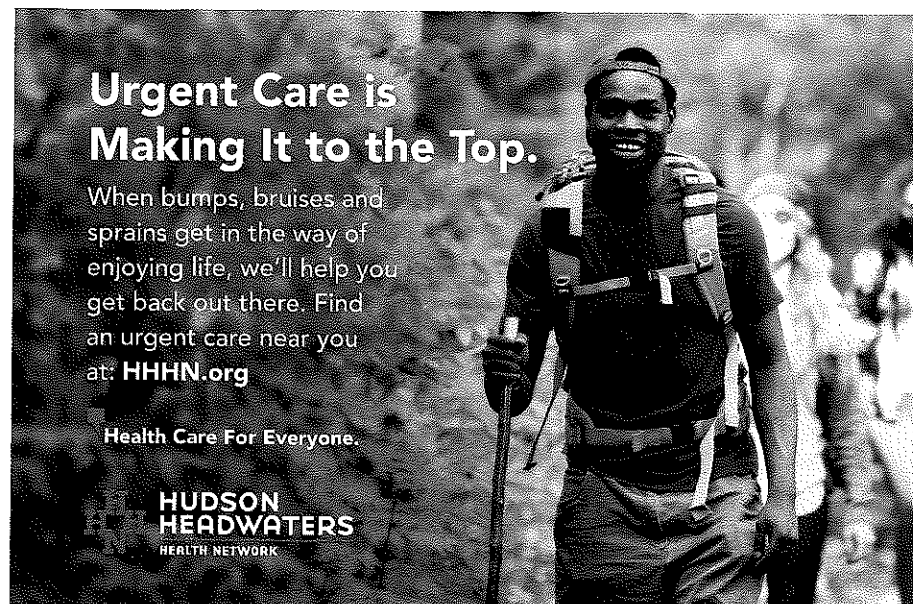
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