

Northwest Public Health

Spring/Summer 2004 • Volume 21 Number 1

Public Health Tackles Emerging Diseases



**Planning
Education
Quarantine**



**Tickborne Disease
West Nile Virus
Hepatitis C
Norovirus**

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The Northwest Is Rising to the Challenges of Emerging Diseases



The range of challenges resulting from globalization, including emerging and re-emerging infectious diseases, came home to me in rural Washington. After I became Dean of this School, I spent a couple of years making the rounds of the 34 local health jurisdictions in our state. During those visits I was surprised to observe how many health departments, rural as well as urban, were dealing with HIV/AIDS, hepatitis C, widespread drug use, and a growing number of cases of antibiotic-resistant TB and other reemerging diseases, as well as a range of problems related to multi-ethnic communities.

Since then, we've seen West Nile virus spread west across the country, SARS arrive from across the Pacific, and BSE (mad cow disease) make its way south from Canada. And lest we think we are only importers of infectious diseases, consider that most of the HIV/AIDS victims in Japan contracted their disease from infected American blood products.

It seems such a short time ago that we thought our miracle drugs had essentially conquered infectious diseases. Today we know better. Glancing through the *Seattle Post-Intelligencer* recently, I saw stories on the world's drug-resistant TB hotspots, now found on four continents; Utah bracing for the West Nile virus season; the USDA proposing new standards for BSE testing; and how an outbreak of avian flu could lead to a chicken shortage in British Columbia. Far from being conquered, in fact, infectious diseases are the leading cause of death worldwide.

There are many reasons for this surge in infectious diseases, some of which are discussed in these pages. While new infections, including HIV/AIDS, West Nile virus, and SARS, continue to emerge, some old foes, such as TB and malaria, have become resistant to traditional therapies and are making a remarkable comeback. Changes in land use can cause microbes to thrive. International travel and global commerce are often the mechanisms for the spread of disease, and with its many ports of entry to the Pacific Rim, the Northwest is vulnerable on both counts. Every year, unprecedented numbers of travelers enter our region, the most trade-dependent in the nation. Because our food safety system is being overwhelmed, insects and contaminated products make their way easily across our borders. We have much to learn about the interplay between globalization and emerging infectious diseases.

Fortunately, we also have resources. Researchers worldwide, including many in this School, are working in such areas as drug resistance, the genetic diversity of viruses, avenues of transmission, and the social and economic causes for the emergence or reemergence of infectious diseases. The Bill & Melinda Gates Foundation and other groups are expending extraordinary amounts of money and energy to reduce global health inequities, promote vaccine development, and prevent disease transmission. And the dedicated public health workforce I encountered on my tour around this state—and that exists throughout the Northwest—is committed to responding to challenges as they emerge. This issue of *Northwest Public Health* offers an excellent overview of some of those efforts.

A handwritten signature in dark ink, which reads "Patricia W. Wahl". The signature is fluid and cursive.

Patricia W. Wahl, Dean
*UW School of Public Health
and Community Medicine*

University of Washington School
of Public Health and Community Medicine

Patricia W. Wahl, PhD, Dean

Editor-in-Chief

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Page 12. Rocky Mountain wood tick. Iowa State
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Page 14. Stormdrain. Judith Yarrow.

Page 18. Work Projects Administration Poster
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Northwest Public Health
Health Policy Analysis Program
1107 NE 45th Street, Suite 400
Seattle, Washington 98105
(206) 685-2617, Fax (206) 543-9345
nph@u.washington.edu
www.nwcp.org/nph/

Look for Northwest Public Health
online at www.nwcp.org/nph

From the Editor



When I was a senior in college back in the Midwest (just after the last Ice Age), I set about researching graduate programs that would give me a broad training in public health. Those I talked with recommended the University of Toronto, and so that's where I went. I got what I wanted out of the program, but I found the information imparted by the faculty to be quite dated. When people have asked about my graduate school, I often describe it as having "gained its reputation back in the era of infectious diseases." I meant that derogatorily—after all, I entered the field when the spotlight was on "community health," the organization and financing of health services, and the more "modern" afflictions of heart disease, accidents, chronic disability, and the like. Infectious disease was something in the past, of interest only to a few historians and bench scientists.

My bad!

If I or any of us needed a refresher course that humans remain vulnerable to viruses, bacteria, and other tiny bugs, we have gotten an intensive one over the past few years. If we needed to be reminded that *Homo sapiens* have enough in common with other animals to share their infections, we've gotten that, too. And, if anyone doubted that "globalization" was as much a biologic as an economic phenomenon, the now well-tracked movements of SARS, West Nile, and influenza across the globe are proof-positive. The *Northwest Region at a Glance* (p. 5) reveals our vulnerabilities in data about transportation patterns in each state.

These sobering realities certainly challenge our abilities and resources to protect the public's health. But, as William Foege's *Viewpoint* (p. 4) emphasizes, the more profound thing is that they challenge our way of thinking. Foege, former CDC director, counsels that we can no longer separate global actions from local actions, that we need to consider these realms simultaneously. He suggests that the Northwest is well-situated to be a leader in this approach to public health, with its strong base of local and state public health agencies and research and training institutions whose reach extends around the world, a view shared by Dean Patricia Wahl (p. 2).

The message of Ann Marie Kimball's lead article (p. 6), which reviews the factors—what's known and what isn't—that contribute to emergence or reemergence of diseases and infections, is that we have to keep on our toes. Fortunately, we have many public health professionals and organizations doing just that, making progress in efforts to prepare for and respond to infectious diseases outbreaks. The article by Christopher Thomas, Scott Seys, and Joseph Grandpre (p. 12) reports on a successful campaign to educate Wyoming residents about how to avoid West Nile virus and the mosquitoes that carry it. According to Gayle Shirley's sleuth piece (p. 8), Montana public health officials effectively solicited the public's help in identifying a new tickborne disease; this is a great read that makes tick investigations sound exciting ... really!

Of course, many challenges to protecting communities from emerging infections remain. Merilee Karr (p. 10) describes how one public health measure (clean water) can lead to unintended consequences (mosquito breeding habitat). The known infectious diseases hepatitis C and norovirus pose continuing challenges that will require prevention and treatment efforts for some time to come, according to articles by Jack Jourden (p. 16) and Matt Jaqua (p. 18), respectively. And Alonzo Plough, Jo Ellen Warner, and Michael Loehr (p. 14) remind us that a global or local outbreak can require the extraordinary measures of isolation and quarantine, and we need to prepare for those possibilities now.

I trust you will find this issue of *Northwest Public Health* interesting and useful. As always, we welcome and encourage your comments.


Aaron Katz, *Editor-in-Chief*
Senior Lecturer, Health Services, UWSPHCM

Our Place in the World

William Foege

In 1950, the United States developed a surveillance program for malaria, its first national surveillance program for any disease. The program revealed that malaria had quietly disappeared in this country in the 1940s but no one knew it. People had continued to get fevers, and they recovered after malaria treatment, as most people do even in the absence of malaria. This reinforced the idea that the disease was still around. Not until each case was investigated, bloods were drawn to determine the type of malaria, and a series of negative lab tests resulted, did the reality become obvious. Malaria was gone. It was the accumulation of local reports that permitted a national picture. And that is the lesson. No national or global interpretation is possible, separate from many local images.

No national or global interpretation is possible, separate from many local images. But the opposite is also true.

But the opposite is also true. Local interpretations require national or global information. In the spring of 2002, a Lutheran bishop attended a meeting in West Africa. He returned to the United States, was seen for fever in Chicago, and died of malaria. The local response was adequate for most local problems, but not for the actual problem, because it drew diagnostic conclusions without a global view.

The detection, analysis, and response to disease problems require balancing local and global information. The bumper sticker "Think Globally, Act Locally" is catchy but inadequate, because every place is simultaneously local and global, depending only on perspective. The phrase should be, "Think *and* Act, Globally *and* Locally." It is akin to the question of whether one should strive to be a generalist or a specialist. The answer is that we must strive to be both simultaneously, to understand as much as we can about the world in order to know where our

special skills, knowledge, and experience fit in.

The world improvement in health depends on the highest quality response in every locality and often becomes victim to the weakest links. In 1975, health workers were ready to celebrate the demise of smallpox as the last outbreaks in the world were being contained in Ethiopia. But somehow, in what should have been the final week of global smallpox, the virus escaped to Somalia. It required an additional two years to finally interrupt transmission. Global containment was held hostage to local containment.

The Yale theologian, Jaroslav Pelikan, has said that although good scholarship is often traced to the place of training and the mentors a person has had, great scholarship is often traced to how much a person knows beyond his or her field of study. Great local public health is often traced to how much is known beyond the geographic locality and how much is known beyond health.

The Pacific Northwest has rapidly gained a deserved reputation for contributions to the health of the world. These contributions include research aimed at the disease problems of poor people in other countries, people involved in programs of global scope, nongovernmental agencies directing operations in every country of the world, foundations supporting programs for all people now and in the future, and a corporate community actively working to make responsible contributions to a rational global future.

At the same time, we are also blessed with unsurpassed clinical facilities and competent state and local health departments staffed by people who are working on approaches to quickly detect and diagnose unusual episodes, share information with national and global authorities, and respond to contain infectious agents. It is a great public health example of thinking and acting both locally and globally. ❖❖

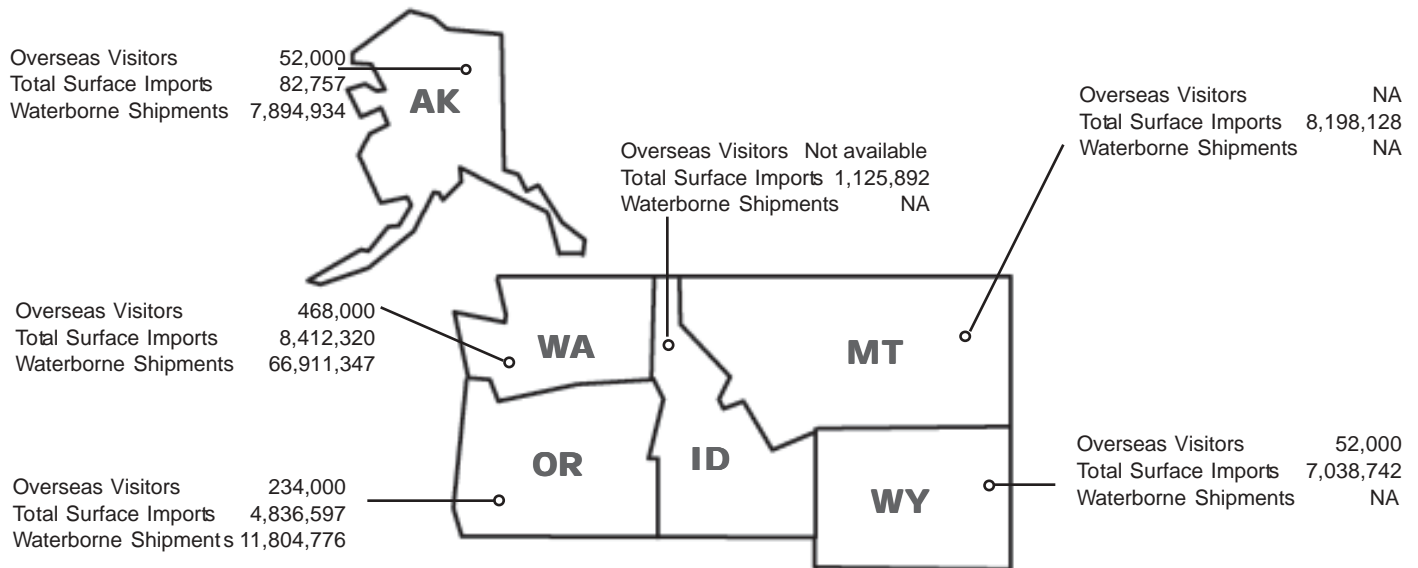
Author

William Foege, MD, MPH, has been the director of CDC and the Carter Center and is currently a fellow at the Bill and Melinda Gates Foundation.

Northwest Region at a Glance

Transportation Patterns

What does transportation have to do with public health? For one thing it's an indicator of the vulnerability of local populations to emerging or re-emerging illnesses. No place is completely isolated from the world anymore. Trucks, trains, airplanes, and ships carry with them interstate and international hitchhikers—old and new diseases—ready to adapt to new hosts.



Notes: All data are from 2000; surface imports are in metric tons, and are from Canada and Mexico; waterborne imports are in short tons; overseas visitors are international arrivals not in transit, excluding those from Canada and Mexico.

Sources: **Overseas visitors:** U.S. Department of Commerce, International Trade Administration, Office of Tourism Industries, *Overseas Visitors to Select U.S. States and Territories 1999-2000 (Ranked by 2000 Market Share)*, Washington, DC: 2001. <http://tinnet.ita.doc.gov/>; **Surface imports:** Bureau of Transportation Statistics, www.bts.gov/ntda/tbscd/reports/annual02/state/w2002_wa.html; **Waterborne shipments:** Port of Portland, www.portofportlandor.com/Marineset_new.asp; Bureau of Transportation, Alaska profile, www.bts.gov/publications/transportation_profiles/alaska/excel/table_03_10.xls; 2002 WA State Data Book, www.ofm.wa.gov/databook/economy/ct17.htm.

Some Microbes and Infectious Diseases Recognized Since 1977

Year	Microbe	Type	Disease
1977	Ebola virus	Virus	Ebola hemorrhagic fever
1977	Legionella pneumophila	Bacteria	Legionnaires' disease
1977	Hantaa virus	Virus	Hemorrhagic fever with renal syndrome (HRFS)
1977	Campylobacter jejuni	Bacteria	Enteric pathogens distributed globally
1980	Human T-lymphotropic	Virus	T-cell lymphoma-leukemia virus I (HTLV-I)
1981	Toxic-producing strains of Staphylococcus aureus	Bacteria	Toxic shock syndrome (tampon use)
1982	Escherichia coli O157:H7	Bacteria	Hemorrhagic colitis; hemolytic uremic syndrome
1982	HTLV-II	Virus	Hairy cell leukemia
1982	Borrelia burgdorferi	Bacteria	Lyme disease
1983	Human immunodeficiency virus	Virus	Acquired immunodeficiency syndrome (AIDS)
1983	Helicobacter pylori	Bacteria	Peptic ulcer disease
1986	Cyclospora cayatanensis	Parasite	Persistent diarrhea
1988	Human herpesvirus-6	Virus	Roseola subitum
1989	Hepatitis C	Virus	Parenterally transmitted Non-A, Non-B, liver infection
1991	Encephalitozoon hellem	Parasite	Conjunctivitis, disseminated disease
1992	Bartonella henselae	Bacteria	Cat-scratch disease; bacillary angiomatosis
1993	Sin nombre virus	Virus	Adult respiratory distress syndrome
2003	SARS-associated corona virus	Virus	Severe acute respiratory syndrome (SARS)

Source: 1995 Report of the Committee on International Science, Engineering and Technology Policy. From the Federation of American Scientists, www.fas.org/promed/about/table2.html (February 03, 2004).

Human Diseases— Still Emerging, Still Dangerous

This year the public health community has been shaken by the emergence of a seemingly endless list of new human infections, reminding us that new human pathogens are not just a thing of the past.

Ann Marie Kimball

The threat of new and reemerging diseases was first outlined in the 1992 Institute of Medicine Report *Emerging Infections* and reiterated in its 2003 report *Microbial Threats to Health*. The 1992 report included these factors of emergence: demographics and behavior change; changes in land use, technology, trade, and travel; microbial adaptation and change; and the breakdown in public health. These factors were expanded in the 2003 report to include climate change, harmful intent, and the gap between the rich and poor of the world. The importance of these factors in putting populations at risk of new diseases has been demonstrated repeatedly over the past decade with outbreaks such as HIV/AIDS and SARS. (See page 4 for a list of some of the microbes and diseases recognized since 1977.)

How do new human infections arise and enter our populations? This question really has two parts: where do such new agents originate? and how do they get transmitted around the globe?

How do new diseases arise?

The outlining of the factors of emergence by the National Academy's expert group is essentially an intuitive process. To date, no published empirical studies test the hypothesized relationship of a given factor to the occurrence of a new infection.

Historically, new human infections come from other vertebrates. HIV/AIDS is now believed to have hopped the species barrier between simians (monkeys and their relatives) and humans sometime in the 1930s. The infection, which was not highly communicable, remained at a low level until political chaos, warfare, and massive population displacements in

Central Africa in the early 1980s enhanced its

amplification in populations there. Travel and trade in blood products promoted distribution around the globe.

Another example, SARS, is a coronavirus, believed to have hopped species from either the palm civet cat or a species of rat. The studies on its origin are conflicting. But what is notable is that when this outbreak occurred, the "human health" experts knew little about the Coronavirus family, since this is, historically, a minor pathogen for humans. However, the veterinary experts knew a great deal more; disease due to Coronaviridae is an important cause of morbidity in animals. In the wake of such infections as SARS, the importance of linkages between animal and human medicine is very clear.

An even more recent example is avian influenza, which in late 2003 and early 2004 swept through a number of Asian countries. This outbreak of highly pathogenic avian influenza has produced a handful of human cases. With the emergence of avian influenza in Asia, and the threat of reassortment and human to human transmission, pandemic influenza planning has become urgent. Such a planning exercise under the auspices of the Asia Pacific Economic Cooperation is being developed through an international network run by the University of Washington.

Although influenza virus is tracked in more than 100 laboratories worldwide through the efforts of the World Health Organization, predicting the antigenic "shift" and "drift" of this RNA virus remains elusive. Strategies for population protection are limited and include isolation and quarantine, antiviral use at the first clinical signs of illness, and prophylactic vaccination. The United States strategy relies almost completely on annual vaccination of high-risk groups. The success of this approach hinges on annual reconstitution of the vaccine and administration of that vaccine to target population groups. In 2003 the exclusion of the circulating Fujian strain of flu compromised the success of vaccination efforts. A compounding problem is that the vaccine production and distribution is largely limited to Europe and North America.

Emerging infections are those whose incidence in humans has increased within the past two decades or threatens to increase in the near future. Emergence may be due to the spread of a new agent, to the recognition of an infection that has been present in the population but has gone undetected, or to the realization that an established disease has an infectious origin. Emergence may also be used to describe the reappearance (or "reemergence") of a known infection after a decline in incidence.

—*Emerging Infectious Diseases: Microbial Threats to Health in the United States*, Institute of Medicine, 1992

How do they arrive here?

The question of how new infections get here is much more straightforward. SARS traveled by airplane, but it is not the first pathogen to do so. Measles importations occur frequently, and multidrug tuberculosis and influenza have also been spread aboard aircraft. But pathogens travel in all transportation modes. An unseasonable outbreak of influenza with an unusual strain, for example, was brought to Alaska on a cruise ship by tourists from Australia. It is important to remember that trade in commodities can actually be one way animals “travel”; products derived from animal and human material can convey and amplify infection. For example, Japan cites the global trade in blood products as the source of its HIV disease.

The gap in science

How does the macro (climate, demographic changes, and so on) influence the micro (viruses, for example) in provoking these emergent outbreaks? What mechanisms are at work, for example, that translate the changes in animal husbandry and beef processing in the United Kingdom into the emergence of a prion disease such as mad cow (bovine spongiform encephalopathy)? Despite a decade of description about how these epidemics occur, the basic knowledge base that would allow public health to prevent their emergence still seems to lag.

An example will illustrate this gap. The consolidation of meat processing in the United States resulted in the gathering, in feed lots, of unprecedented numbers of cattle who traveled longer distances to reach slaughtering facilities. Because cattle are not fed before slaughter, the combination of crowding and starving probably increased the shedding of and cross infection of animals with *E. coli* O157H7. The mechanization of slaughter, trimming, and packing of beef, with a larger volume of infected material moving through processing at a faster rate, probably contributed to the eventual appearance of *E. coli* O157H7 as a major human epidemic pathogen in 1997 in Washington State. The outbreak detected in Washington was actually part of a five-state outbreak that was not picked up by surveillance in the other four states.

We know the path the outbreak followed, but exactly how the emergence of *E. coli* O157H7 occurred as a new pathogen in humans remains obscure. What mechanisms at the molecular level may have been involved in the evolution of the human pathogenicity of the organism? What is the “tipping point” after which consolidation of the processing of animal material becomes risky?

Should a limit be placed on such consolidation, and if so, what metrics would be followed in defining such a limit? Public health would do well to link seriously with food science and veterinary medicine, among other disciplines, to begin to develop a research agenda to answer these questions. Why? Without answers, a primary prevention agenda for food safety cannot be scientifically tailored to prevent the emergence of new human pathogens.

Factors of Emergence Revisited

Various factors contribute to the emergence or reemergence of diseases and infections. Among those factors are:

- Microbial adaptation and change
- Human demographics and behavior
- International travel and commerce
- Human susceptibility to infection
- Poverty and social inequality
- Breakdown of public health
- Economic development and land use
- Climate and weather
- Changing ecosystems
- Technology and industry
- War and famine
- Lack of political will
- Intent to harm

Public health responds

As the response to SARS illustrated, public health practice has relied on old tools for containment when faced with an outbreak of a new, unknown infection. But SARS also demonstrated the power of public health's new communication, networking, and modeling tools. Now public health authorities can communicate their experience with a new infection more rapidly than ever using e-mail and the Internet.

The University of Washington's international network of public health and commerce authorities in the Asia Pacific demonstrates the kind of deliberate networking that is important for planning and preparedness for responses to epidemics. In addition, modern modeling techniques allow the rapid determination of the reproductive rate of an epidemic if good quality epidemiologic field data are available, so the characteristics of an agent—for example, its contagiousness—can be known early in an event and shared across outbreak locations.

The response to public health emergencies such as SARS has given policy makers insight into the need to extend preparedness planning, partnerships, and practice beyond a narrow focus on bioterrorism. Public health authorities need to incorporate planning for emerging infections into their biopreparedness plans at every opportunity. If we think of SARS and avian influenza as “shots across the bow” of public health, it is time to ensure a sound course to avoid a more serious engagement. ❖❖

Resources

Asia-Pacific Economic Cooperation, Regional Health Threats. http://apec.org/apec/apec_information_on.html.

Emerging/Reemerging Diseases (PAHO). www.paho.org/english/ad/dpc/cd/eid-eer.htm.

Health and Borders: Comparing global to international & local visions of health and disease. <http://caribou.cc.trincoll.edu/~jtrostle/main.html>.

The United States Army Medical Research Institute for Infectious Diseases - USAMRIID. www.usamriid.army.mil/index.html.

World Health Organization. Strategies for Fighting Emerging/Reemerging Diseases: Preparedness and Response Plans. www.who.int/csr/delibepidemics/en/Preparednessproject.pdf.

Author

Ann Marie Kimball, MD, MPH, is director of APEC EINET and a professor of Epidemiology and of Biomedical Informatics at the University of Washington.

Tracking Down a Mysterious Tickborne Disease

Hidden away in Todd Damrow's freezer are the cold, dead bodies of Eunice, Filbert, and Harold. As spring approaches, Damrow looks forward to watching the body count rise.

Gayle C. Shirley

Damrow may sound like the villain in a sordid murder case, but he's actually one of the good guys in a public health mystery that may result in the discovery of a new disease in humans.

Damrow is the Montana state epidemiologist, and—along with his colleagues at the Montana Department of Public Health and Human Services, the Centers for Disease Control and Prevention (CDC), and the National Institutes of Health (NIH) Rocky Mountain Laboratories—he has spent the past few years investigating reports of a tickborne rash similar to that found in Lyme disease.

Eunice, Filbert, and Harold are Rocky Mountain wood ticks (*Dermacentor andersoni*), and they are among the subjects in the group's investigation.

Damrow first suspected something strange was going on a few years ago, when he began getting reports from patients and physicians of what appeared to be Lyme disease. The patients complained of fever and severe fatigue, as well as odd circular rashes at the site of a previous tick bite. The symptoms were similar to those of Lyme disease, but only deer ticks carry Lyme disease, and deer ticks are not indigenous to Montana. In addition, Montana is the only state, according to

Damrow, that has never had a documented case of Lyme disease that was acquired in-state.

The rash also was not characteristic of Rocky Mountain spotted fever or other tickborne diseases in Montana.

"We'd do tests for Lyme disease, and they'd always come up negative," Damrow said. "So we could tell them what they didn't have, but not what they did have."

Then one spring, a public health worker mailed Damrow a photo of the distinctive rash. It was unlike anything he had seen before, and it prompted him to launch a more formal investigation. He knew CDC was looking into Lyme-like symptoms caused by unidentified infectious agents in Lone Star ticks in Texas and dog ticks in Missouri. Could the same thing be happening with wood ticks in Montana?

Lyme disease is not caused directly by ticks but by a spiral-shaped bacterium called *Borrelia burgdorferi* that invades the salivary glands of deer ticks (*Ixodes scapularis*). When an infected deer tick inserts its mouth into a human host to feast on his or her blood, it transfers the bacteria to the human. The tick must be attached to the person's skin for at least two days to spread the infection.

In the United States, Lyme disease occurs primarily in the northeastern, mid-Atlantic, and upper north-central regions and along the Pacific coast. It usually features a telltale circular or oval-shaped red rash that starts at the site of a tick bite and enlarges during the next several days or weeks. The rash is accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, muscle aches, and joint aches. The disease is rarely fatal, though it can be severe, chronic, and disabling. In its early stages, it usually responds well to antibiotics.

In 2002, 23,763 cases of Lyme disease were reported to CDC. The number of cases has been escalating, possibly because of an increase in the number of housing developments being built in rural areas, where deer ticks usually live.

In the Montana cases, Damrow hypothesized, perhaps some previously unknown *Borrelia* species had adapted to the wood tick. He worried that the unusual rash might not be the only effect of this potentially new disease.

The only way to solve the mystery was to collect the offending ticks, extract DNA from their salivary glands, and study it with molecular probes to find out whether some new bacterium or other pathogen had infected the ticks.

"So, last spring we launched a 'save the tick' campaign," Damrow said.

Through news releases and public service announcements on radio and TV, the state Department of Public Health and Human Services (DPHHS) asked Montanans who found ticks embedded in their skin to carefully remove the tick, drop it alive into a plastic bag, and take it immediately to their county health department.

DPHHS staff also notified physicians and county health workers about the study, and they



Adult female Rocky Mountain wood tick, *Dermacentor andersoni*.

became integral partners in the research effort. They collected the ticks, documented patients' symptoms, and mailed the ticks to DPHHS.

Damrow was hoping to collect around 100 tick samples. "We thought it would be pretty hard to get people to hang onto ticks after removing them," he said. "Usually you just want to throw the nasty little buggers in the trash."

But the public information campaign was more effective than he had dared to hope. He soon had a collection of about 350 ticks. "And that was after excluding the ones that didn't actually bite someone."

As the bugs accumulated in his office, Damrow dropped them into individual test tubes and stored them in the office freezer to preserve their DNA.

"When the first ticks started coming in we were real excited, and we were pleasantly surprised that people were so cooperative," he said. "Some people even gave their ticks names and were really attached to them—no pun intended."

This spring, as the snow melts and famished wood ticks become active, Damrow will again launch his public information campaign and will again begin collecting tick samples. His colleague, CDC epidemiologist Kammy Johnson, plans to start tracking bite victims to find out whether the mysterious disease has any late-developing or long-term effects.

DPHHS enlisted researchers at the NIH Rocky Mountain Laboratories in Hamilton,

Montana, to search for antibodies in the blood of bite victims that might help to identify the pathogen and confirm its role in the disease. The partnership with the labs seemed especially appropriate, Damrow noted, since it was the first laboratory to identify Rocky Mountain spotted fever almost a century ago. And in 1982, a scientist at the lab identified the causative agent in Lyme disease.

Damrow is mindful of the serious potential of any new disease, but he can't help but get enthusiastic about the chance to play detective. "We're really excited about this, because it isn't often that you get a chance to discover a new disease," he said. "This may be our chance—and that's why public health exists."

Damrow and his partners in deduction hope to solve their public health mystery and reveal the culprit sometime in the next couple of years. ❁❁

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Gayle C. Shirley is the public information officer for the Montana Department of Public Health and Human Services.

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Research in the Rockies: The Rocky Mountain Laboratories

At the turn of the twentieth century, Rocky Mountain Laboratories (RML) comprised a few researchers working in scattered tents. Today, it is a vital research campus in small-town Hamilton, Montana, employing some 250 people.

RML scientists came to national prominence in the early 1900s, when they proved that the bacterial agent of Rocky Mountain spotted fever could be transmitted from wood ticks to humans. Today, some of the most skilled scientists in the world are working at the labs to unveil the mysteries behind a range of infectious diseases, including illnesses linked to prion proteins: mad cow disease in cattle, scrapie in sheep, chronic wasting disease in big-game animals, and Creutzfeldt-Jacob disease in humans.

Significant discoveries made by RML scientists over the years include identifying the causative agents of Q fever and Lyme disease. During World War II, RML scientists also helped produce vaccines to protect soldiers against spotted fever, yellow fever, and typhus.

As part of the National Institute of Allergy and Infectious Diseases, a component of the National Institutes of Health, RML's primary mission is to help develop new and improved medical tools to diagnose, treat, and vaccinate people to protect them from infectious diseases.

RML is organized much like a small college. Its activities are centered in three main laboratories: the Laboratory of Human Bacterial Pathogenesis, the Laboratory of Intracellular Parasites, and the Laboratory of Persistent Viral Diseases. RML also has the Rocky Mountain Veterinary Branch and the Administrative and Facilities Management Section, both of which support the research functions.

For more information about the Rocky Mountain Laboratories, visit their Web site at www.niaid.nih.gov/dir/infobl4/bsl4faq.htm. ❁❁

Mosquitoes Call Stormdrains “Home”

In the battle against mosquitoes carrying West Nile Virus, it's time for public health to wade into questions of stormwater management.

Merilee D. Karr

Public health professionals following the course of West Nile virus across North America expected Oregon, one of the holdouts of 2002, to face at least a few infections last year in animals, humans, or both. Despite expectations, West Nile virus has not yet appeared in Oregon—the only continental state that has not turned up a single positive mosquito, bird, mammal, or human.

That respite will give Oregon another year to prepare—and part of the preparation includes a new collaboration between mosquito control and water management agencies.

From the Roman aqueducts to Bonneville Dam, humans have built structures to moderate the extremes of natural water flow. Some of these structures, from Roman cisterns to the catch basins under modern city streets, have inadvertently supplied mosquitoes with standing water, their preferred breeding habitat. The urban environment is rich with mosquito habitat, from old tires to paper cups left out on the deck. Even more mosquito habitat may have been created in the last decade by a change in the Clean Water Act of 1972.

The original drive behind the Act was the elimination of sewage and industrial discharge into water ways. In the 1990s, new regulations aimed at preventing pollution due to urban stormwater runoff. The problem is that there are two basic methods of cleaning stormwater: filtering through earth, vegetation, or manufactured filters, and retaining the water to let particulates settle. New studies show that water retention methods, such as the familiar catch basin, may breed mosquitoes. Even if retention structures are designed to minimize mosquito habitat by draining quickly, they may malfunction without regular maintenance.

Mosquito habitat and stormwater

In 2002 a group of scientists with the California Department of Health Services reported in the journal *Stormwater* on a nationwide survey of public works agencies, regarding their experience with mosquitoes in stormwater management structures—manholes, catch basins, filters, vegetated swales, and others. Fully 86 percent of the reporting agencies had seen mosquito production in these structures.

A follow-up observational study in Southern California showed mosquitoes' clear preference for certain styles of stormwater management architecture. Those that maintained standing water in ponds,

basins, or sumps for more than a few days supported mosquito hatcheries. Those that drained rapidly such as swales and other filtration devices, rarely harbored mosquitoes.

In Portland, mosquito surveillance and control activities are performed by the Multnomah County Vector and Nuisance Control unit, part of the Environmental Health division of the health department. Since the 1930s, when Portland faced regular outbreaks of malaria, this department or its predecessors have quietly worked to prevent diseases carried by mosquitoes and other vectors. Multnomah County may have one of the oldest continuously active mosquito control programs in the western United States.

Multnomah County catch basins and manholes were studied in 2002 for the presence of mosquito larvae. Chris Wirth, supervisor of Multnomah County Vector and Nuisance Control, and David Turner, supervisor of Field Operations in the same department, reported on their study in *Stormwater Treatment Northwest*. Of more than ten thousand manholes, 99 percent harbored mosquito larvae. Of almost two thousand catch basins, 75 percent supported mosquito larvae. After treatment with the microbial larvicide *Bacillus sphaericus*, all structures remained free of larvae for up to four weeks.

Stormwater professionals are now reviewing existing equipment and proposed designs, trying to balance the old imperative of pollution reduction and the new one of mosquito habitat reduction. Modifying existing structures can be laborious and expensive.

Moreover the structures mandated by the Clean Water Act are not the only ones that produce mosquitoes. Most cities began building their stormwater collection systems in the early decades of their history to prevent flooding. Many older, pre-Clean Water Act stormwater management structures, including thousands of catch basins and manholes, already provide abundant mosquito habitat.

Keeping it flowing

Stormwater structures on private property present another set of problems, according to a recent study by Michael J. Pronold, City of Portland environmental program manager. Since the late 1990s, new construction projects in Portland have been required to incorporate on-site



stormwater treatment structures. However, there is no requirement for inspection of these structures. With inadequate maintenance, vegetation or debris could reduce the drainage of water through such structures and therefore allow mosquito-friendly water accumulation. Manufactured stormwater filtration systems also need regular changing of the filters.

Pronold randomly selected thirty-five sites, residential, commercial, and industrial, most less than two years old. Of 33 structures he inspected, only 18 owners or other responsible parties knew of the stormwater structure on their property. Only 6 were following an approved maintenance plan. At several sites, different stormwater structures had been built than the ones for which the permit had been issued.

Pronold recommends inspection for stormwater structures on private property. But with available staff and resources, he writes, "It is apparent that the majority of the residential properties will not be inspected."

The Chicago Tribune, in a postmortem analysis of the 2002 West Nile epidemic in Illinois, reported that the failure to make the connection between stormwater management structures and mosquito habitat was a major contributor to the epidemic. The south suburban mosquito control district did not begin to treat mosquito-producing catch basins with mosquito larvicide until August, when Chicagoans were already dying, and streets and yards were littered with dead crows. By the end of that summer, Chicago had seen 884 human infections and 64 deaths. More than a thousand catch basins were also rediscovered in wet backyards, built decades ago and never recorded in any database.

In 2003, Chicago catch basins were treated with larvicide early and often, and Illinois saw only 50 infections and one death due to the virus. The pattern of disease incidence, seen repeatedly across the country, is of a sharply decreased case count in the second year of the epidemic. In some localities, the drop in cases occurred in the third year. It can not be known how much of the case reduction has been achieved by the improvement, or in some areas commencement, of mosquito control activities, which have been initiated by public demand in virtually every jurisdiction.

Tracing stormwater structures

Pinning disease outbreaks to nearby stormwater structures, deploying scarce environmental and public health resources, and controlling mosquitoes in largely invisible stormwater structures will require a systematic approach. Maps and databases can be difficult to compile, especially in older urban areas, since many of these structures were built decades ago, and the records

may no longer be accurate or even exist. Some municipalities have good databases, but no data-sharing capacity with adjacent communities within a mosquito's flight range. When public health departments confront most disease outbreaks, they make good use of a directory of human habitat—the phone book. A similar directory of mosquito habitat (stormwater structures) could be helpful in combating mosquito-borne diseases.

West Nile virus has given new visibility to stormwater structures. New designs are needed to prevent mosquito production. In the meantime, much needs to be done with the stormwater structures already in the ground. Although the studies done in California and Portland demonstrate that mosquito production is likely in catch basins and manholes, these studies do not demonstrate that all catch basins and manholes are hatching out mosquitoes or that, even if they are, those mosquitoes belong to disease-carrying species. Nevertheless, municipalities should look at their stormwater systems with new concern, even if the evidence does not support blanket larvicide application. Stormwater structures, ubiquitous as they are under urban and suburban streets, may be significant contributors to summer mosquito swarms. Mosquito surveillance and species identification are essential if disease prevention is to be achieved and resources used efficiently.

This opportunity could be wasted, however, if agencies cannot locate all of their stormwater structures. Information management was not a concern when most stormwater structures were built. They could be trusted to do their underground water control work without human attention. But vector control will require regular staff attention to stormwater structures. Databases will need to be compiled, using information technology that is compatible with that of regional partners within a mosquito's flight range.

Preventing both vector-borne disease and water pollution will take collaboration, interdisciplinary and interagency, between vector control and stormwater professionals. Both fields stand to gain new skills, new tools, and new understanding from each other.

West Nile virus is not nearly as serious a public health problem as influenza, which is not mosquito-borne, or malaria, which is. But, mild as West Nile may be, it is the first mosquito-borne disease in a long time that has attacked North America with any large numbers of infections, and it has captured the public imagination. And most importantly, it has clearly disclosed the erosion of the nation's public health system's capacity to respond to vector-borne disease outbreaks. We can hope that the attention paid to West Nile virus, however disproportionate, will strengthen our leaking public health systems, drained by public complacency. ❧❧

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Author

Merilee D. Karr, MD, is a family physician and freelance science writer in Portland, Oregon.

The Five D's: A West Nile Education Campaign in Wyoming

Christopher N. Thomas
 Scott A. Seys
 Joseph R. Grandpre

West Nile virus (WNV) was first detected in Wyoming in August 2002. By the end of 2002, two humans, 17 birds, and 96 horses had tested positive for the virus, mainly in eastern Wyoming. The Wyoming Department of Health gave numerous community presentations throughout the state during 2002, but it conducted no official education campaign. Despite the presentations, the department was overwhelmed with requests for information on the background of the disease, prevention, and animal testing for WNV.

Applying a model for health communication

Public health often finds itself in a “reactive” position because, given the nature of public health, events can happen without warning or notice. This can lead to very little time to plan a public education campaign. Anticipating increased transmission of WNV to humans, birds, horses, and other mammals in 2003, the department began to develop a statewide WNV public education campaign during the winter of 2002-2003. Planning for the Wyoming WNV campaign included convening a group of state health department experts in communication, health education and promotion, and infectious

diseases; searching existing WNV Web sites of city, county, and state health departments in the United States to learn about other campaigns; and choosing a media relations firm to help develop a campaign logo and materials that would be unique and representative of Wyoming. The department also discussed using a health education theory early in the planning process to help guide the creation and evaluation of the campaign's messages.

The Health Belief Model, a widely used health education model, was chosen for the WNV campaign because of its simple design and past success in health interventions. U.S. Public Health Service psychologists originally developed the model in the 1950s to increase the use of preventive services such as chest x-rays for tuberculosis screening and immunizations for influenza. Since then, the model has also been used to explain health behaviors and design interventions in many other areas, such as cancer screenings, HIV/AIDS, and prenatal care, as well as in multicultural settings.

The model has six concepts: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

- Perceived susceptibility is a person's perception of being at risk of contracting a disease.
- Perceived severity focuses on a person's feelings of the seriousness and effects of contracting the disease.
- Perceived benefits are a person's opinion of the effectiveness of taking recommended actions to prevent contraction of the disease or its effects.
- Perceived barriers are the negative aspects or costs, as viewed by the person, to taking the preventive action.
- Cues to action are the triggers used to encourage people to take the recommended actions to prevent the disease.
- Self-efficacy refers to people's confidence that they can successfully perform an action and prevent the occurrence of new disease.

Creating campaign messages

We created the campaign messages first to ensure that all materials presented a consistent

Health Belief Model Campaign Messages

Concept	WNV Campaign Messages
Perceived Susceptibility	<ul style="list-style-type: none"> • Anyone from infants to the elderly can contract West Nile Virus. • People over 50 years old are at more risk for West Nile fever and West Nile encephalitis.
Perceived Severity	<ul style="list-style-type: none"> • West Nile Virus can lead to severe illness, hospitalization, and possibly death in certain populations. • West Nile fever and encephalitis may result in serious illness or hospitalization.
Cues to Action	5 D's of West Nile Virus Prevention: <ul style="list-style-type: none"> • Avoid being outside at dawn and dusk if possible. • Drain standing water and containers that collect water on your property. • Dress in long sleeved, long-legged clothing. • Use mosquito repellent with DEET according to the label.

message. The campaign used the Health Belief Model concepts of perceived susceptibility, perceived severity, and cues to action. We used the perceived susceptibility component to create a message that ensured the public knew who was at risk for contracting WNV. The campaign emphasized that people over 50 years old were especially at risk for West Nile fever and West Nile encephalitis.

The perceived severity component focused on defining the signs and symptoms of West Nile fever and West Nile encephalitis, as well as on the long-term consequences of the disease to the general population.

Finally, using the cues to action component, we created simple, easy-to-follow actions people could take to prevent contracting WNV. "The 5 D's"—Dawn, Dusk, DEET, Drain, and Dress—as they came to be known, were designed to be an easy-to-remember alliterative message for promoting relatively simple actions the public could take to prevent contracting WNV. (See the table on page 12 for examples of the campaign messages created using the Health Belief Model.)

Campaign materials included banners, radio announcements, bookmarks, brochures, newspaper advertisements, posters, and wallet cards. Materials were distributed to the public through county public health nursing offices, state and national parks, the University of Wyoming Cooperative Extension Service, and other agencies and organizations. In addition, a Web site (www.badskeeter.org) helped disseminate additional information and offered downloadable copies of the brochures, posters, and wallet cards. The campaign messages using perceived susceptibility, perceived severity, and cues to action were included in almost all campaign materials to ensure a consistent message at all times and in all contexts.

We changed the campaign messages during late summer 2003 to bring additional awareness and attention to the susceptibility and severity of WNV during the projected peak transmission periods for humans. We strengthened campaign messages about the level of susceptibility and severity by intensifying the language of the message. For example, we emphasized the groups most susceptible and the severity of the illness in a second brochure and poster that were printed and distributed in July. The bullets under the perceived susceptibility and perceived severity components in the table on page 12 show the changes to the messages. The new campaign messages further emphasized WNV and its potential effect on humans.

Evaluating campaign successes

From June through October 2003, the Wyoming Department of Health distributed approximately 327,000 bookmarks, brochures, posters, and wallet cards throughout Wyoming. The Web site received more than 11,700 visitors from May through October 2003. The Health Belief Model was an easy, simple tool for planning and evaluating the Wyoming Department of Health's 2003 WNV campaign. The model guided the creation and changing of the campaign's messages to meet our needs.

We also conducted an evaluation during 2003 to assess whether the campaign met our goals and needs. The model helped guide the process of developing survey questions to use in evaluating the campaign. We asked evaluation questions concerning campaign reach, behaviors, and attitudes associated with WNV prevention in one pre-test and two post-test surveys. We used past Health Belief Model literature to guide the creation of the questions concerning perceived susceptibility, perceived severity, and cues to action (behavior) components.

Time, resources, and energy can be scarce when public health is forced to react quickly to an outbreak, emerging disease, or other unexpected event. Anticipating increased WNV transmission, the department took a proactive approach to preparing for the disease, using available resources in order to plan the campaign.

Our experience suggests that with a health education theory such as the Health Belief Model and advance planning, public health departments can produce and evaluate high-quality, successful public health campaigns. ❖❖

Authors

Christopher N. Thomas, MS, CHES, is a public health prevention service fellow on assignment from the Centers for Disease Control and Prevention's Epidemiology Program Office. Scott A. Seys, MPH, is the deputy state epidemiologist and section chief of the Epidemiology Section, and Joseph R. Grandpre, PhD, MPH, is the chronic disease epidemiologist, both at the Wyoming Department of Health.

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Bad Skeeter is the logo developed for the West Nile public education campaign.

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Isolation and Quarantine: Surviving A Lethal Outbreak

An outbreak or global epidemic may be only one plane ride, one infected patient, one cruise ship, or one flock of infected birds away.

*Alonzo Plough
Jo Ellen Warner
Michael Loehr*

In February 2004, a child in King County was diagnosed with pneumonia after returning from Asia where he stayed on a chicken farm in a region affected by Avian Influenza H5N1. Local health officials rightly anticipated that something other than avian flu was the culprit of the boy's illness, but the incident was a jarring reminder that we are living on the razor's edge of tragedy. Public health officials no longer ask *if* we will see a pandemic but *when*.

The SARS crisis of 2003 tested modern large-scale isolation and quarantine methods, tools with an infamous history characterized by abuse of power and discrimination against groups and individuals, as well as success in containing serious infections from leprosy to tuberculosis. In the absence of rapid and definitive diagnostic tests, vaccines, or cures, isolation and quarantine remain our best countermeasures against the spread of mass illness—illness that could overwhelm hospitals, overcrowd morgues, cripple essential services, and wreak social and economic disorder. Yet, isolation and quarantine require an enormous, complex, and above all, *prepared* community response network to help individuals survive and recover and to guide a community through a period of unpredictability, uncertainty, and loss.

To prepare for a local outbreak, health officials in Seattle and King County are applying the lessons learned from containing SARS in Toronto, Canada, where there were 438 SARS cases and 43 deaths. During the outbreak in Toronto, 13,000 individuals were isolated or quarantined, requiring 23,000 follow-up contacts to monitor their symptoms. Yet, Dr. William Bowie, a Canadian infectious disease expert, said recently that, compared to a flu pandemic, "SARS is going to look like a joke."

Isolation refers to the separation from those who are healthy and possible hospitalization for treatment of *ill* persons with a confirmed or suspected communicable disease. *Quarantine* is the separation or restriction of activities of *well* persons who are believed to have been exposed to a communicable disease and are therefore at highest risk of becoming infected. Quarantined individuals are confined for the longest usual incubation period of the infectious agent. An individual's home is the preferred setting for both isolation and quarantine.

Isolation and quarantine measures are generally applied on an individual basis. Broader community containment measures, however, may be applied to groups of persons or to communities during outbreaks with extensive transmission of disease. These interventions would be used to increase social distance among community members (for example, cancellation of public gatherings, use of masks, or implementation of community-wide "snow days").

Both isolation and quarantine are usually voluntary but may also be mandatory. Depending on the risk of epidemic propagation and the scale of an outbreak, designated facilities could be used to quarantine large numbers of people.

The local health officer has the authority and responsibility to direct a person or group to isolate or quarantine themselves, or to issue emergency detention orders to ensure compliance. To protect civil liberties and ensure fair treatment of individuals ordered into isolation or quarantine, a judicial system of due process is in place. The Toronto SARS outbreak gave a hopeful indication that the public understands that the ethics of isolation and quarantine require balancing individual freedoms and protecting the public from a potentially lethal disease. Almost all of the 13,000 Toronto citizens in isolation or quarantined complied voluntarily; of the 27 detention orders issued, only one was appealed. It was later withdrawn.

Anticipating an epidemic

Public Health - Seattle & King County (Public Health) is the lead agency preparing the county for a contagion potentially requiring isolation and quarantine. Public Health's plan for dealing with an infectious disease outbreak involves dozens of agencies, including local health care providers, health facilities, emergency management personnel, law enforcement agencies, and community-based organizations. These agencies must build strong partnerships now and be ready to combine forces to halt the spread of communicable disease. Public Health is also preparing a sweeping county-wide plan to secure and distribute drugs or vaccines from the Strategic National Stockpile across the county quickly.

Public Health's plan must meet the needs of King County's 1.8 million people—a population equal to or greater than 14 of the 50 United States,

Authors

Dr. Alonzo Plough is director and health officer of Public Health - Seattle & King County and associate professor in the Health Services department at the University of Washington School of Public Health and Community Medicine. Jo Ellen Warner is an education and risk communication specialist, and Michael Loehr is emergency manager, both with Public Health - Seattle & King County.

which swells each weekday with an additional 400,000 workers. Thirty-nine suburban cities, as well as rural communities in the eastern portion, have vulnerable populations of significant scale, including people with disabilities, homeless individuals, people with serious mental illnesses, minority groups, non-English speakers, children, and frail elderly. Many do not have a regular health care provider and are beyond the reach of traditional public health and other emergency response systems. As many as 50 to 60 languages are spoken in the schools, and at least 10 language groups require regular translation and interpreter services in public health clinics alone.

Public Health's plan connects King County's 19 hospitals, more than 7,000 medical professionals, 27 community health centers, several specialty care facilities, and numerous primary care organizations into a dynamic response network. First response organizations are included in this network of preparedness planning—30 fire departments that provide basic or advanced life support response throughout the county, 8 HAZMAT teams, and 29 local law enforcement agencies.

Seattle is also an international port of entry with a high level of threat not only for acts of terrorism but also for infectious diseases such as SARS and Norwalk virus. Each year nearly 26 million passengers travel through SeaTac Airport with more than 2.2 million of these going to or coming from international destinations. During the five-month summer season, more than 100 cruise ships carrying nearly 200,000 passengers disembark.

Planning to handle thousands

Clinically and logistically, isolation and quarantine require complex management strategies to deal with sick or exposed people. The range of strategies is designed to facilitate early recognition of symptoms and reduce the risk of transmission.

Isolation and quarantine can place great stress on individuals or households, requiring people to stay home from work, and in some cases forego earnings, and temporarily dividing families where it may be necessary to separate an ill family member from children or other vulnerable family members.

Public Health's plan includes coordinating with regional partners to deliver essential goods and services, such as food and medicines, to persons in quarantine and isolation and to meet their social, psychological, and financial needs.

Public Health is preparing to respond head-on to the challenges, but deep concerns remain about the ability to meet the enormous strain on all the agencies involved in carrying out the functions of an isolation and quarantine plan. The possibility of skyrocketing staffing demands and costs and

Local public health plan for dealing with an infectious disease outbreak

- Identify, evaluate, and monitor contacts of patients and people in isolation
- Assess the safety and suitability of the home environment for isolation or quarantine
- Identify facilities for persons who do not have access to an appropriate home setting, such as travelers and homeless populations
- Develop educational materials in appropriate languages and literacy levels, and provide interpreter services
- Monitor and evaluate isolated or quarantined individuals and coordinate necessary medical care and follow-up
- Monitor the course and extent of the outbreak and evaluate the need for community containment measures
- Coordinate with the prosecuting attorney's office and superior court to issue legally binding isolation and quarantine orders, as well as ensure that isolated and quarantined patients have access to legal representation
- Train law enforcement and other first responders in the use of personal protective equipment
- Prepare law enforcement to enforce isolation and quarantine orders issued in their jurisdiction

draining resources from other important programs and services are of most concern.

Public Health has discovered that just a few isolated individuals or quarantined households can stretch the agency's resources to its limits. It conducted approximately 150 SARS investigations in 2003. During the peak of the local SARS activity Public Health received one phone call from the public or a health provider every 10 minutes. The 2003 SARS response required 16 full-time Public Health staff to be reassigned for several months from their existing duties to manage the workload.

An outbreak involving hundreds or thousands of households would require an unprecedented surge in response capacity, especially if public health, hospital workers, and other staff became ill. Health care workers and first responders would be at higher risk than the general population, further impeding the care of victims. This was the case in Hong Kong and Toronto, where hospital personnel became infected with SARS, and some died. Widespread illness could also increase the shortage of personnel in other sectors that provide critical community services, such as utility and transportation workers.

Providing information to the public is an essential service during a public health emergency, creating additional pressure on public health and other agencies. Over the five-month outbreak in Toronto, the city established a public hotline number that received more than 300,000 calls, with a peak of 47,567 calls in one day.

The public health system is the frontline of defense against emerging and re-emerging infectious diseases and is continually being asked to expand its emergency role to protect communities against bioterrorism and threats that emerge from nature. At the same time, the system is providing, without adequate resources, a spectrum of services to create the conditions in which people can be healthy. Attempting to do more and more with less already takes superhuman effort, but public health's thinning resources perhaps poses the greatest threat to the successful containment of an outbreak.

The King County child has recovered, but a 12-year-old boy in Vietnam has died from Avian Influenza H5N1. As of March his death was the country's fifteenth fatality. Eight other people have died in Thailand. Scientists continue to monitor for possible human-to-human transmission of lethal flu strains or other diseases. Sooner or later, we could be fighting one on our own shores and, with preparedness and luck, stop it in its tracks. ❖❖

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Hepatitis C: Not New but Still Emerging

Jack Jourden

Severe acute respiratory syndrome (SARS), West Nile virus, bovine spongiform encephalopathy (mad cow disease), and smallpox have grabbed the headlines recently, but outside the limelight hepatitis C virus (HCV) has emerged as one of the most prevalent causes of infectious disease in the United States over the past 10 years. Through the end of 2003 the Centers for Disease Control and Prevention (CDC) estimates that the number of cases of HCV-caused liver illness in the United States is around four million, 1.8 percent of the population. It also estimates that of those infected with HCV about 75-85 percent will become chronically infected. In addition, the annual number of deaths from chronic liver disease accounts for about 25,000 deaths per year. Studies indicate that HCV may account for about 40 percent, or 10,000, of those deaths.

Now specific and reliable tests can detect the presence of the antibody to HCV in up to 97 percent of infected cases. The antibody test, though, cannot distinguish the difference between acute, chronic, or resolved infection.

The transmission of the C virus is primarily through exposure to infected blood, although sexual transmission has been documented. Before the advent of testing in the early 1990s the risk from blood transfusion and blood products was relatively high (*see Fig. 1*). Since the implementation of specific screening tests, and refinements to those tests, the risk of exposure to the HCV virus through blood transfusion has all but been eliminated in the United States. But that may not be the case in many parts of the world where blood is not routinely screened. Today the primary risk of exposure to HCV in the United States is through injection drug use. The mode of transmission in these cases is most likely through the sharing of syringes or equipment used when injecting illicit drugs.

Although sexual transmission has been documented in the transmission of HCV, the frequency of sexual exposure and the type of sexual activity have been neither accurately determined nor adequately studied. Other risk factors have also been documented in the transmission of HCV, such as tattooing, occupational exposure to blood as a health care worker, and mother-to-child transmission during birth.

Somewhere from 15-25 percent of those acutely infected by HCV may fully resolve their infection. The remaining 75-85 percent develop chronic disease. Of these, more than half may go on to develop active liver disease, including damage that could result in the need for liver transplantation. But there are some treatment options for those who develop chronic disease. A recently developed synthetically produced protein called alpha-interferon has demonstrated some success by stopping the hepatitis C virus from continuing to damage the liver. Persons who are concerned about being infected with the virus through a blood-borne or other high-risk exposure should be tested for HCV and consult their physician if found positive.

HCV in Washington

The picture of HCV infection in Washington State mirrors the nation as a whole. The Washington State Department of Health estimates

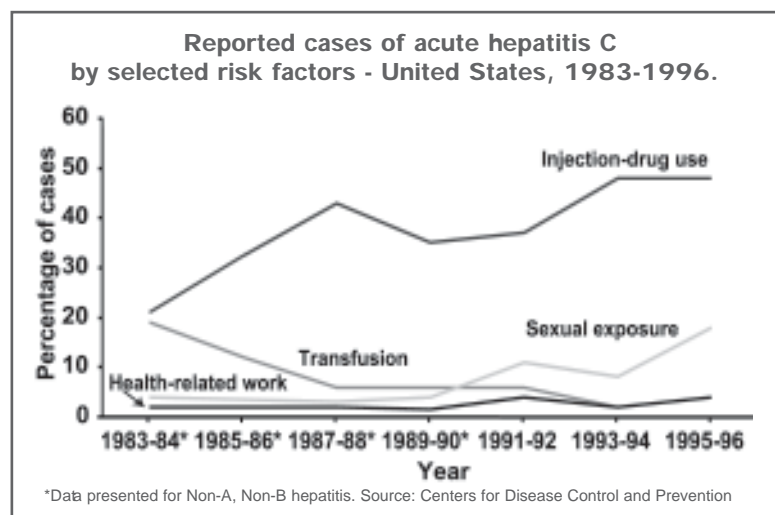


Figure 1. Reported cases of acute hepatitis C. Graph from: Recommendations for prevention and control of hepatitis C virus (HCV). *Morbidity and Mortality Weekly Report*, October 16, 1998. RR-19.

Background

Identified in 1989 as a specific RNA virus in the Flaviviridae family, HCV has at least six different genotypes and more than 90 subtypes. Before that identification, the hepatitis C virus was most often classified as Non-A, Non-B to distinguish it from the hepatitis A and hepatitis B viruses, both of which are now preventable with specific vaccines. Currently at least six viruses are known to cause liver disease: A, B, C, D, E, and G. Prior to the identification of the C virus, no tests detected the presence of the virus.

that 100,000 persons in the state are infected with HCV. Of these, approximately 70,000 will develop chronic infection, approximately 15,000 may develop cirrhosis, and as many as 1,000 may develop liver cancer within 20 years. About 250 deaths occur each year in Washington as a result of hepatitis C infection.

In Washington, chronic HCV infection has been a reportable condition since December 2000. Washington Administrative Code (WAC) 246-101 requires that chronic HCV infection be reported to local health departments on a monthly basis by health care providers and health care facilities. The local departments then send the information to the Washington State Department of Health. Some exceptions to this practice do exist. For example, Pierce County, as a national sentinel hepatitis site, has had laboratory-based reporting of HCV infection to the Tacoma-Pierce County Health Department since 1992.

The state responds

In an effort to address this emerging infection, the Washington State Legislature passed Substitute Senate Bill 5039 during its 2003 session calling for the development of a state plan to document, prevent, and treat HCV. It mandated the Secretary of Health to create a plan for the education, prevention, and management of HCV in Washington State. Through the advice and guidance of a representative committee of experts, stakeholders, providers, and advocates, the health department has completed that plan and has begun to implement its many phases and recommendations (*see box for the plan's focus area*). Although the State Department of Health is identified as lead for many of the plan's components, it will be calling on various advisors, providers, stakeholders, and advocates to assist in the implementation of that plan.

Prevention activities for HCV are crucial due to the lack of a preventive vaccine. Although, as previously mentioned, vaccines for both hepatitis A and B exist, one for hepatitis C has yet to be developed. Research continues in the development of a vaccine, as well as the ability to find a tissue culture outside the human body in which to study the virus. In the meantime, the prevention of hepatitis C depends on knowing one's status, particularly if there is a history of blood exposure to someone who has either acute or chronic hepatitis C. Additionally, a better understanding needs to be gained of the prevalence of hepatitis C within the state through more consistent reporting of both acute and chronic hepatitis C by providers and laboratories. Finally, more research on the

mechanisms of transmission needs to be conducted.

The incidence of HCV infection has gradually decreased since the early 1990s, but the prevalence of HCV will be a focus for prevention and treatment into the immediate future. The need remains to ensure that blood exposure, whether through drug injection, accidentally in medical or emergency situations, or tattooing or body piercing, is addressed with the knowledge and intention of reducing this emerging disease. ❖❖

Goals for Strategic Planning

DOH convened an advisory committee of 34 key stakeholders and community members to assist with the development of a strategic plan to address hepatitis C. The advisory committee was divided into four workgroups to address education, prevention, management, and funding as outlined in the legislation for implementation of the plan. Each workgroup identified one primary goal. Those goals are:

Education	Provide education and training in HCV for health care professionals, policy makers, high-risk populations, HCV-infected people, and the general public, including those in schools
Prevention	Significantly decrease the number of people newly infected with HCV, using the most effective prevention strategies
Management	Identify effective, accessible, and affordable case management and treatment services to prevent or limit the progression and complications of HCV infection, and improve the affected individual's quality of life
Funding	Develop strategies for providing adequate, sustainable resources for funding the implementation and maintenance of Washington State Hepatitis C Strategic Plan recommendations developed by the advisory committee

Author

Jack Jourden, MPH, is director of Infectious Disease and Reproductive Health at Washington State Department of Health.

Resources

Alter, MJ. *Acute Viral Hepatitis in the United States* www.hepnet.com/hepc/ass1d00/alter.html.

CDC. <http://www.cdc.gov/hepatitis>.

Hepatitis Awareness Everett C. Koop Institute, Dartmouth College. www.epidemic.org/index2.html.

Recommendations for prevention and control of hepatitis C virus (HCV). *MMWR*. October 16, 1998;47:(RR-19):1-39.

Thomas DL. Hepatitis C Epidemiologic Quandaries. *Clinics in Liver Disease* 2001 Nov;5(4).

Worman HJ. Hepatitis C Sourcebook. *Clinics in Liver Disease* 2001 Nov;5(4).

Norovirus: Coming Soon to a Venue Near You

Matt Jaqua

Over the last two years the public health system in the United States has increasingly focused attention on potential or theoretical threats from bioterrorism agents such as botulism, plague, and smallpox. Meanwhile the lowly norovirus is with us on a daily basis, generating few headlines but causing more illness and death than bioterrorism probably ever will.

Most of our society is intimately familiar with the effects of this single-strand RNA virus, characterized by the rapid onset of vomiting or diarrhea, with a 24- to 48-hour duration. It is easy to transmit via the fecal-oral route (or by airborne transmission when someone vomits) and is often referred to as “stomach flu” or “the 24-hour bug.” Although the illness is self-limiting, and most cases resolve without intervention, its ease of transmission makes it a major health concern.

The Centers for Disease Control and Prevention in 1999 identified norovirus as a major food safety concern, causing two-thirds of all foodborne illnesses, as well as one-third of all hospitalizations and seven percent of all deaths attributed to foodborne causes. What norovirus may lack in lethality, it makes up for in sheer volume of victims, an estimated 23 million cases annually.

Outbreaks on numerous cruise ships in 2002 first brought this virus widespread attention, but public health practitioners have routinely identified it as the cause of foodborne illness outbreaks since the late 1990s.

Ten years ago, norovirus was considered a minor player in the communicable disease world. The lack of a practical laboratory test prior to 1997 severely limited the ability to assess its true effect. But now, as a result of technological advances and greater awareness in the communicable disease community, we’re discovering that the more we look, the more we find. Many outbreaks that in the past would have been categorized as of “unknown etiology” are now being confirmed as norovirus.

Oregon’s Communicable Disease Summary for 2002 lists 93 disease outbreaks, with almost half (38 confirmed, 5 suspected) attributed to norovirus. Preliminary data for 2003 lists more than 130 disease outbreaks in Oregon, 69 of which were caused by norovirus. Most of the 2003 outbreaks involved foodborne transmission of the virus, but at least a third occurred in care facilities where person-to-person transmission is most common.

Current communicable disease rules dictate that food workers diagnosed with certain diseases be excluded from work, but norovirus is rarely diagnosed in a clinical setting. Even if infective individuals do not work when they are ill, they are back on the job as soon as symptoms resolve, even though they will continue to shed virus for as many as 3-10 days.

Residential care facilities face the same concerns around contagious food workers, but with an additional twist. The people who serve the meals in these facilities are also the people who perform general assistance tasks and clean up after ill residents, so they may transmit norovirus from one resident to another even if they are not infectious themselves. This type of employee-facilitated, person-to-person outbreak is increasingly common across the whole spectrum of senior care facilities. It takes a diligent staff to contain an outbreak in a residential facility, and the facility is extremely fortunate if no residents experience severe complications. The risk of serious or fatal complications increase in skilled nursing facilities, where residents are more medically fragile and require more intense staff attention.

The hard reality is that most food service and care center employees don’t get paid if they don’t show up. Even conscientious employees feel pressure to hide their illness from their employers and work while still infectious. Dealing with these realities involves addressing wages, benefits, and job responsibilities—areas beyond the current scope of public health practice. This is why policies on ill employees returning to work must be reevaluated.

The emergence of norovirus highlights the need for both new policies and a return to one of the most basic public health concepts: the critical importance of personal hygiene.

Oregon’s current “Cover Your Cough” campaign sends the message that basic precautions can help prevent transmission of respiratory diseases that have no vaccine or cure. We also need a similar public information campaign targeting gastrointestinal illnesses.

Young children need to be taught the how and when of handwashing, with an emphasis on the simple message that people who wash their hands when they should don’t get sick as often as people who don’t wash them. We need to emphasize that scrubbing the bad stuff from your hands is what does the trick, that sanitizer gels and antibacterial soap don’t really help.

Public health must educate medical practitioners so they can identify cases and outbreaks of norovirus. We must educate the food-service and senior-care industries on the risks associated with norovirus, particularly the fact that even thorough handwashing is not going to make it safe for an ill employee to work with food or medically fragile people.

Finally, research into this pervasive organism must continue so we know how long people remain infectious, how to destroy the virus on surfaces, and how much it truly affects all of us. ❧❧



WPA poster, 1939.

Author

Matt Jaqua, BS, REHS, is the Environmental Health supervisor for Yamhill County (Oregon) Public Health.

Emerging Diseases

Laura Larsson

Avian Influenza. World Health Organization. www.who.int/health_topics/avian_influenza/en/. Although not fully populated yet, this page provides links to descriptions of activities, reports, news, events, and contacts and cooperating partners in related WHO programs.

Addressing Infectious Disease Threats. Current Fact Sheets. Association of State and Territorial Directors of Health Promotion and Public Health Education. www.astdhppe.org/infectintro.asp. Describes what infectious diseases are, explains why infectious diseases are both emerging and reemerging, provides prevention suggestions, and concludes by describing the critical role for health professionals in communicating disease risk. Hotlines and a table of infectious diseases, agents, and modes of transmission are available for health professional use.

Center for the Study of Emerging Diseases. Saint Louis University School of Public Health. www.emerginginfections.slu.edu/. Provides a high-quality list of emerging infections complete with fact sheets, educational material, key references including online articles and case studies, official remarks and reports, news, and Internet resources. Visitors can search for information via mode of transmission, organism, and syndrome. Also helpful is the clear image of each organism on each disease mentioned.

Discussion Groups. World Health Organization. Resources Forum. E-mail Discussion Groups and Lists. www.who.int/tdr/kh/bittdre.htm. Lists subscription information and brief descriptions of a variety of e-mail discussion groups related to infectious diseases.

Emerging Infectious Diseases. National Institute of Allergy and Infectious Disease. Division of Microbiology and Infectious Diseases. www.niaid.nih.gov/dmid/eid/. This site provides fact sheets and brochures about antimicrobial resistance, news releases, staff presentations and papers, reports and articles, research plans and priorities, and meetings. Useful links are also offered.

FASTATS: Infectious Disease. National Center for Health Statistics. www.cdc.gov/nchs/fastats/infectis.htm. High-quality source of morbidity data for specified infectious diseases with links to additional sources of data and information.

Hepatitis Information Network: HepNet - Hepatitis C. www.hepnet.com/hepc.html. This site gives information on news, events, and information for physicians and patients. The home page lists New Additions and provides links to Epidemiology, Natural History (of the disease), Management, and Future Directions. Links to hepatitis A, B, D, and E are also given.

Lyme Disease Network. www.lymenet.org/. The Lyme Disease Network is a nonprofit foundation dedicated to public education on the prevention and treatment of Lyme disease and other tickborne illnesses. Support groups, an online library, legal resources, medical abstracts, a newsletter, books, pictures, and additional information can be found on the site.

Policy. Trust for America's Health Reports. <http://healthyamericans.org/reports/tfah/>. A set of reports critical of public health's readiness to cope with animal diseases, bird flu epidemics, SARS, and related topics.

SARS: Timeline. CBC News Online. www.cbc.ca/news/indepth/background/sars_timeline.html. Describes the onset of SARS from its discovery February 15, 2003, and traces events in China and Canada to June 11, 2003.

Selected Emerging Infectious Diseases. Hardin MD: Infectious Diseases/Bacterial Diseases/Microbiology. www.lib.uiowa.edu/hardin/md/micro.html. Hardin MD is a list of directory sites. The Infectious Diseases/Bacterial Diseases/Microbiology site points the reader to large, medium-length, and short lists of sites on specific emerging diseases. Of particular interest are the large number of images included on the listed sites. Only the most important and constantly updated directory sites are listed.

Society for Medical Anthropology, Global Health, and Emerging Disease Study Group (formerly the International Health and Infectious Disease Study Group). www.medanthro.net/research/globalhealth/index.html. Describes the Study Group's activities and discussion lists and provides academic resources and other links of related interest.

Tickborne Relapsing Fever. Schwan TG, Policastro PF, Miller Z, Thompson RL, Damrow T, Keirans JE. Tickborne relapsing fever caused by *Borrelia hermsii*, Montana. *Emerg Infect Dis*. www.cdc.gov/ncidod/EID/vol9no9/03-0280.htm. This helpful article describes the history of tickborne relapsing fever, the vector that causes it, and the study that led to the publication of the article.

Tuberculosis. Centers for Disease Control and Prevention. Health Topic. www.cdc.gov/health/tb.htm. CDC has prepared sections of interest to the public, to travelers, workers, and clinicians and epidemiologists.

West Nile Virus. Washington State Department of Health. www.doh.wa.gov/ehp/ts/Zoo/WNV/WNV.html. The Web site gives clinical information for health care providers, environmental health information for state and local agencies and other organizations, useful information for the public, and maps, statistics, and news releases. Information on mosquito repellents and on mosquitoes is available in two brochures. ❖❖

Author

Laura Larsson, MLS, is on the clinical faculty of the Health Services department in the University of Washington School of Public Health and Community Medicine. She can be contacted at larsson@u.washington.edu.

More Resources Online

For a list of more than 130 resources annotated by Laura Larsson, see our Web site at www.nwcp.org/nph/s2004/.

Winning the Vote for Public Health in Yellowstone County

Carolyn Wenger
Joseph N. Roth, Jr.

We were no longer in a position to, even grudgingly, reduce services as funds disappeared. We had to find a way to convince voters to increase our funding.

When public health's wake-up call rang in 2001, it left many in the field questioning our capacity to manage both our expanding role and our existing obligations. As federal officials and newscasters advised people to "contact local health departments for more information," it raised an unsettling question—Who would be there to answer the phone? In the realm of resource scarcity in which public health has evolved, resourcefulness and creative problem solving have enabled those in the field to maintain steady progress toward better health for our communities. However, the rapid changes in 2001 confirmed the suspicions of the Yellowstone City-County Health Department and Board of Health. We had reached a point in which our resources could no longer be stretched to meet our community obligations.

Yellowstone County is located in south-central Montana. The population is slightly over 130,000. Agriculture is an important industry in the rural areas of the county. Billings is the county seat with a population of approximately 100,000. Service industries, including hospitals, schools, and restaurants, are the predominant employers. Yellowstone City-County Health Department is located within Billings, but serves the entire county. The health department provides 23 different programs.

Although the events of 2001 served as a catalyst for acknowledging our deficiencies, infectious disease management and bioterrorism were only two of our concerns. Compared to twenty years ago, we have half as many sanitarians inspecting twice as many restaurants, daycare centers, and other public facilities. Our immunization staff has been cut in half, but the numbers of immunizations and individuals to be immunized have doubled. Although these changes demonstrated our increased efficiency, it also meant we were not able to offer the depth of service we once provided. Sadly, the public no longer expected that a public health nurse would conduct a home visit for newborns or that permits for new subdivisions would be processed in a reasonable time period.

Yellowstone citizens did, however, expect that a basic level of enforcement and preparedness existed—that restaurants were being inspected with the level of scrutiny that was once common-

place and that basic family services were available to those most in need. Years of diminishing funding, however, had eroded our capacity to manage these basic functions of public health and provide the services we were legally obligated to provide. We were no longer in a position to, even grudgingly, reduce services as funds disappeared. We had to find a way to convince voters to increase our funding.

The Board of Health approached a mill levy proposal cautiously, since the local political climate was unsupportive of such proposals. No new taxes and a general disenchantment with increased government were thematic. But staff involvement with multiple anthrax threats, communicable disease trends, and legal advice convinced the board to empower the executive staff to pursue an assessment of the community and legal options for presenting a levy proposal in the next election.

Assessing community expectations

The health department contracted with a local university in June 2002 to assess the attitudes and knowledge of county voters regarding public health issues and the department. In a random survey of registered voters in the county, a total of 403 surveys were completed, resulting in a margin of error of +/- 5 percent. When asked in open-ended question format about services or programs offered by the department, 44.8 percent of respondents were unable to name a service. This lack of public knowledge about public health programs was discouraging but not completely unexpected. Public health has a history of non-recognition by communities.

Although respondents lacked knowledge about specific programs, they acknowledged the importance of programs such as immunizations, communicable disease, helping senior citizens and families, restaurant inspections, public food service inspections, bioterrorism coordination and preparation, and hazardous spill response.

Of the respondents, 87.1 percent were unaware of the size of the public health budget. When told that the budget for these activities was \$304,000, and that the department was experiencing difficulties running these programs, 38.5

percent reported that they would be likely to vote for the levy, 25.8 percent said they would be very likely to vote for the levy, 20.8 percent did not know, and 14.9 percent were unlikely or very unlikely to vote positively.

Campaigning for public support

Weighing not only survey results but necessity, timing, and commitment to public health, the Board of Health voted to proceed with the mill levy proposal. Because a county entity is prohibited by Montana law to lobby for funding proposals, various board members, health care professionals, and citizens formed the Citizens for Public Health and Safety Committee to manage the levy campaign. The committee decided that the key message to voters would be safety. The anniversary of September 11 was a reminder to citizens of our vulnerabilities.

The committee received consent from the Yellowstone County Commissioners for the mill levy to be on the November ballot. The committee was led by non-health department citizens. Money was raised through personal contacts and group events, including a fund-raising dinner. Given the limited time frame of August-November, the committee implemented a very minimalist campaign of targeted mailings, yard signs, and posters of support.

Although the group was committed to the proposal, it lacked experience in working together and working on mill levy campaigns. In particular, members were reluctant to participate in fund raising. Most committee members worked full-time, and some were limited by Hatch Act provisions. This meant the group had to hold very early morning meetings that did not conflict with work hours.

The committee planned a bipartisan strategy, since two-thirds of the voters in Yellowstone County were registered as Republicans, with fewer than one-third Democrats. Visits to both party organizations garnered needed support. Although Billings has a population of 100,000, for successful passage of the levy, support of small communities in the county was necessary. Fortunately, grassroots approaches in western rural areas are often effective in political processes.

The committee sought key representatives from specific community sectors and obtained support from key businesses for public education purposes. For example, a restaurateur offered to put tabletop information in his restaurants as well as contact other restaurant owners.

The group identified a list of key local organizations to target both for support and for

community education purposes. It also developed media programs, among other activities, placing posters on buses to promote awareness about public health.

With a budget of only \$9,000, the committee had limited resources for advertising so it purchased no television time. It also decided to send limited mailings, focusing primarily on people who were already on department mailing lists and people who lived within precincts that had a history of voting positively for mill levies. The committee also printed yard signs and placed them in high traffic areas.

A speakers' bureau was organized to deliver presentations to community groups, and the committee created pamphlets for distribution at speaking engagements. In less than 90 days, speakers went to more than 200 meetings to discuss the proposition and the important work of the health department. Responses, for the most part, were exceedingly supportive, although we also heard indifference and opposition.

The local television and newspapers were extremely supportive, contributing time and space to public health efforts, including such stories as "a day in the life of a public health nurse" and hospice program efforts.

The committee's intensive efforts paid off. In spite of the fact that five other propositions were also on the ballot, the mill levy passed by a margin of 28 votes! Tallyed votes included 23,121 against the proposal and 23,149 in favor of the proposal. Given the extensive history of mill levy rejections in this county, we were pleased with our victory, despite the narrow margin. The vote was also influenced by our affiliation with a separate mill levy request for fluoridation of water. This proposal was overwhelmingly defeated for the third time in recent history. Other local government groups trying to pass similar mill levies should keep in mind the importance of being associated with only one issue.

The passage of this mill levy has promoted program expansion and our mandate to the core functions of public health. More important, it has promoted education and interest in public health throughout the county. ❖❖

Authors

Carolyn Wenger, RN, MSN, is interim campus director at Montana State University and a member of the Yellowstone City-County Board of Health in Billings, Montana. Joseph N. Roth, Jr., MPH, is manager of Preventive Health Services at Yellowstone City-County Health Department.

Fortunately, grassroots approaches in western rural areas are often effective in political processes.

What Our Governors Say About Health

In their annual addresses to their legislatures, the governors of the six Northwest states each mentioned health care issues. Among their concerns were workforce expansion and training and affordability of and access to medical care.

Alaska

Governor Frank H. Murkowski, January 23, 2003.

"The delivery of adequate health care is a real challenge, made more difficult by the escalating costs of Medicaid." The Governor asked the Departments of Labor and Workforce Development and Health and Social Services (DHS) to work together to ensure a sufficient number of qualified health care professionals throughout Alaska. He also directed DHS to identify strategies to maximize federal and state resources to improve the delivery of health care services along with preventative health care strategies. Finally, he expected to focus attention on alcohol and inhalant abuse, particularly among young people.

Idaho

Governor Dirk Kempthorne, January 12, 2004

"In this year, our Medicaid reforms are projected to save more than \$80 million. Add that to previous years, and the total is more than \$160 million. Yet not one person has been dropped from our programs. We have improved service while reducing costs." Reforms include actively promoting enrollment in the Healthy Connections program (to provide everyone in Medicaid with a primary care physician to reduce unnecessary and costly emergency room visits) and realigning medical reimbursement rates. The Governor has made long-term care his initiative for the year. He signed into law a 50 percent tax deduction for long-term care insurance and has allocated \$500,000 to increase this deduction to a full 100 percent. He went on to emphasize the importance of individuals making significant behavior changes to their diet and exercise in order

to reduce rates of chronic disease and higher costs in health care. "Our focus as a society should not just be on health care, but also on health," he concluded.

Montana

Governor Judy Martz, January 21, 2003

"We can all agree that Montana families deserve an unsurpassed quality of life. We must prioritize health and human service needs, funding what impacts peoples' lives the most. We must maximize the use of federal funding and address rising health care costs." The Governor emphasized the need for a senior discount prescription plan in Montana. She is creating a Medicaid Reform Commission to address growing needs and escalating health care costs, to find ways to make health care more affordable for Montana families, and to provide for those most in need. She went on to discuss her recommendations regarding persons with mental illnesses, which included the need for more community-based programs for the mentally ill by limiting the population at the Montana State Hospital in Warm Springs and creating three regional programs.

In addition to these health care issues, the Governor raised the issue of the shortage of qualified health care workers. She has established a task force to address those shortages.

Oregon

Governor Ted Kulongoski, February 21, 2003

"No one in Oregon should ever be forced to choose between eating and other necessities. One of those other necessities is prescription drugs. I said throughout the campaign that as Governor I would work to lower the cost of prescription drugs."

The Governor plans to form a consortium with Idaho and Washington to pool purchasing power in order to buy drugs at a reasonable cost.

Washington

Governor Gary Locke, January 13, 2004

"I am proposing to extend our gains in key areas: Keeping health care affordable and available by lowering insurance premiums for low- and middle-income families and small businesses, by helping doctors stay in rural communities, and by controlling medical malpractice insurance costs.... A third fundamental right that defines our vision for the state is the right to comprehensive health care that is affordable and available." The Governor went on to emphasize the need for the same quality of care in rural and urban areas and the importance of technology that enables doctors and patients in remote areas to consult with other medical experts around the country. He also pointed out that doctors serving mostly low-income patients deserve increased Medicaid reimbursements for critical services such as childbirth.

Wyoming

Governor David Freudenthal, February 9, 2004

"Staggering increases in insurance costs will drag down family budgets as well as the state's budgets. Failure to take steps to deal with this will cause a domino effect of uncertainty and financial calamity." The Governor urged the legislature to continue to fund the Healthcare Commission, as well as the Commission's recommendation to place before the voters a constitutional amendment setting caps on non-economic damage awards in medical malpractice cases and to establish a medical review panel.

Letter to the Editor

Lessons from TOPOFF 2

Dear Editor:

After reading the article on TOPOFF 2 [Fall/Winter 2003], I would like to provide the perspective of a metropolitan health department, Public Health - Seattle & King County, that may offer lessons for other health jurisdictions.

During a week in early May 2003, more than 100 local, state, and national players took part in TOPOFF 2, a full-scale exercise that assessed how responders and leaders would react to a simulated "dirty bomb" scenario in Seattle and King County and a biological agent attack in Chicago, Illinois. With these two major health emergencies, this federally mandated exercise was proof of how public health is now front and center in national emergency preparedness.

Some of Public Health - Seattle & King County's main responsibilities during the exercise were to coordinate the response for health issues and radiological contamination and to provide accurate and timely health and radiological hazard information to the community. In addition, our department was the primary health and safety advisor to the local elected officials, King County Executive Ron Sims and Seattle Mayor Greg Nickels, who had the final word on deciding protective actions for the population and other measures directly affecting the community's well-being.

In terms of lessons learned, the Department of Homeland Security stated in its after-action report that "coordination of on-site and off-site data collection by multiple agencies at federal, state, and local levels of government need improvement." Indeed, the radiation data guiding our decisions during TOPOFF 2 were

piecemeal and often were late in arriving. Nonetheless, as the local health jurisdiction responsible for the health of a metropolitan area, we had to work through these and other challenges, make the hard choices with the information at our hands, and advance the plans to protect the health of our communities.

During the exercise, we were able to test systems with hospitals and other partners, building on our continued effort to have coordinated responses to health emergencies. We also identified some needs, such as in the areas of technology, staffing, and training. Additionally, we were reminded of how in any emergency, whether it is an earthquake or a dirty bomb, a competent workforce with resourcefulness and good judgment is key.

This experience came at a time when we already had our plate full with a host of real-world issues, including a pertussis outbreak, SARS, and smallpox vaccinations. For Public Health - Seattle & King County and our partners, this exercise was a new demonstration that in preparing the nation for biological, radiological, and other emergencies, the rubber hits the road at the local level.

*Dr. Alonzo Plough, Director and Health Officer
Public Health - Seattle & King County*

Northwest Public Health welcomes your letters. Send letters to: Editor, *Northwest Public Health*, c/o Health Policy Analysis Program, 1107 NE 45th St., Ste. 400, Seattle, WA 98105, or e-mail nph@u.washington.edu. Please include your name and a daytime phone number. Letters may be edited for length and clarity.

Letters published in *Northwest Public Health* do not necessarily represent the views of the journal or the UW School of Public Health and Community Medicine.

Send an online letter to the editor.

Go to www.nwcphp.org/nph/ and click the e-mail link in the online table of contents.



Publications and Web Sites

Population Health Forum.

<https://depts.washington.edu/eqhlth/>.

The Population Health Forum Web site offers extensive resources on the ways political, economic, and social inequalities affect the overall health status of populations.

Secret Agents: The Menace of Emerging Infections.

Drexler M. Joseph Henry Press, Washington DC, 2002. Written for the layperson, but an interesting overview of emerging infections for West Nile, TB, bioterrorism agents, and antibiotic resistant infections such as MRSA (staph). Quotes from interviews with many public health professionals.

Examining mental health: Lessons learned from disaster response trainings.

Cook-Fralick WM. <http://bt.naccho.org/E-newsletter/Mental-Health-in-Crisis-Situations.htm>.

Public Health Readiness E-Link: Advancing Local Practice.

<http://bt.naccho.org/E-newsletter/>
NACCHO's E-newsletter on readiness.

Public resistance or cooperation? A tale of two cities.

Leavitt JW. *Biosecurity and Bioterrorism*. 2003;1:3 www.biosecurityjournal.com/PDFs/v1n303/p185_s.pdf

The article compares a successful and a disastrous intervention in two outbreaks of smallpox.

FluAid.

<http://www2.cdc.gov/od/fluaid/>

FluAid is a test version of software created by the Centers for Disease Control and Prevention to help state and local level planners prepare for the next influenza pandemic by providing estimates of potential impact specific to their locality.

Preparedness Planning for State Health Officials: Nature's Terrorist Attack: Pandemic Influenza.

ASTHO 2002. <http://www.astho.org/pubs/Pandemic%20Influenza.pdf>.

This report identifies major issues that face states during an influenza pandemic. A checklist provides a preliminary means of assessing states' readiness to respond to an influenza pandemic.

Find more resources at Northwest Public Health Online!

Look for the journal at www.nwcpnh.org/nph, where you'll find more resources on emerging diseases, as well as resources from previous issues.

Dates to Note

Send notices for events to the editor at nph@u.washington.edu

May 9-12, 2004

National Environmental Health Association Conference.
Anchorage, AK
<http://neha.org/AEC/>

May 18-20, 2004

Occupational Hazards to Health Care Workers Conference.
Vancouver, BC
http://depts.washington.edu/ehce/NWcenter/course/Health_Care_Workers-04.html

September 7-9, 2004

Montana State Public Health Assoc. Annual Meeting.
Butte, MT
sraph@montana.edu

October 4-6, 2004

WSPHA Joint Conference on Health.
Wenatchee, WA
www.wspha.org

November 5-7, 2004

SOPHE's 55th Annual Meeting.
Washington, DC
<http://www.sophe.org/>

November 6-10, 2004.

APHA 2004 Annual Meeting.
Washington, DC
<http://www.apha.org/meetings/>

December 6-9, 2004

Alaska State Public Health Assoc. Annual Meeting.
Anchorage, AK
www.alaskapublichealth.org

Summer Institutes for Public Health Practice

Sharpen skills and learn cutting-edge practices and techniques.

July 19-23, 2004

Wyoming Summer Institute for Public Health Practice.
U. of Wyoming, Laramie, WY

June 7-11, 2004

Montana Summer Institute for Public Health Practice.
Montana State U-Bozeman, Bozeman, MT

August 2-6, 2004

Seattle Summer Institute for Public Health Practice.
University of Washington, Seattle, WA

September 28-30, 2004

Alaska Public Health Training Institute.
Anchorage, AK

For information about all Summer Institutes contact:
Northwest Center for Public Health Practice
www.healthlinks.washington.edu/nwcpnh/
206-685-1130

State Departments of Health

Alaska: www.hss.state.ak.us/dph/
Idaho: www2.state.id.us/dhw/
Oregon: www.dhs.state.or.us/
Montana: www.dphhs.state.mt.us/
Washington: www.doh.wa.gov/
Wyoming: wdhfs.state.wy.us/

School of Public Health and Community Medicine



The UW School of Public Health and Community Medicine (SPHCM) has five departments—Biostatistics, Environmental Health, Epidemiology, Health Services, and Pathobiology—and multiple interdisciplinary programs, centers, and institutions. The School's emphasis is on strong academic programs in the public health disciplines and extensive multidisciplinary collaboration. The combination of discipline-oriented academic programs, strong interdisciplinary research, and community-based public health activities provides a setting for faculty and students to apply in-depth expertise to important public health problems.

Web site: sphcm.washington.edu/

UW SPHCM Departments

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Health Services:	depts.washington.edu/hserv
Pathobiology:	depts.washington.edu/pathobio/

Find UW SPHCM research center Web sites at:
sphcm.washington.edu/research/centers.htm

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Northwest Public Health is produced by the Health Policy Analysis Program (HPAP) in the Department of Health Services at the UW School of Public Health and Community Medicine. The School established HPAP in 1974 to study the issues and public policy measures that affect the health of communities in Washington State and the Northwest.

Web site: www.hpap.washington.edu

Northwest Center for Public Health Practice

The Northwest Center for Public Health Practice was established in 1991 to coordinate outreach activities for the UW School of Public Health and Community Medicine. The Center has expanded significantly in response to community needs throughout the Northwest. Its activities are geared to enhancing public health workforce development and practice-based research through partnerships that encompass teaching, research, and service in the public health community.

Web site: www.nwcphp.org/

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