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EARTHQUAKES AND VOLCANOES – UNDERESTIMATED HAZARDS

WHILE hurricanes and tsunamis may seem distant hazards, scientists warn that earthquakes and volcanic eruptions are real and not easily predictable dangers to Oregonians. This issue of the CD Summary reviews the potential for natural disasters due to earthquake and volcanic activity in Oregon and offers some recommendations for preparedness that you can help with as a healthcare provider.

VOLCANIC ERUPTIONS

In 1806, Meriwether Lewis and William Clark named a river on the south side of the Columbia River gorge the “Quicksand River.” The wide, shallow river with a bed “formed entirely of quicksand,” bears little resemblance to the narrow, moderately deep river we call the Sandy River today. What happened? The answer lies 50 miles away on Mount Hood. An eruption in the 1790’s caused a tremendous amount of volcanic rock and sand to enter the Sandy River drainage.

Someday Mount Hood will erupt again. Scientists expect small explosions, and the growth and collapse of lava domes, generating pyroclastic flows (high speed avalanches containing hot rock, gas, and ash that lethally burn or asphyxiate all in their paths), ash clouds, and lahars (fast moving slurries of rock, mud, and water formed when pyroclastic flows melt ice or snow that move down river valleys and bury, move or smash objects in their paths). Lava flows and pyroclastic flows rarely travel more than eight miles but the heat generated can cause lahars that devastate populated river valleys in their path. Portland and sites downwind

to the east could be affected by ash-falls disrupting transportation and water supplies, and causing significant air quality concerns for those with respiratory problems.

EARTHQUAKES

The intensity of earthquakes is measured using the logarithmic Richter Scale, which ranges from zero to 10. The San Francisco earthquake of 1906 is estimated to have been a magnitude 7.9 quake, and the recent earthquake in Pakistan is estimated to have been a magnitude 7.6.

Damaging earthquakes in the Northwest can arise from three source zones: the Cascadia subduction zone, the Juan de Fuca oceanic plate, and the North American continental plate. Many Oregonians may not be aware that, since 1993, 24 notable quakes ranging in magnitude from 2.7 – 6.3 have occurred in Oregon. The epicenters of these

quakes were in Portland, Mt. Hood, Lakeview, Klamath Falls, Newport, Adel, Canby, Maupin, Woodburn, Christmas Valley, and Scotts Mills. Epicenters are the surface focus point of an earthquake—the resulting seismicity and damage radiates out from epicenters, factored by the magnitude of the quake. Damage and injury can occur in areas far from the epicenter.

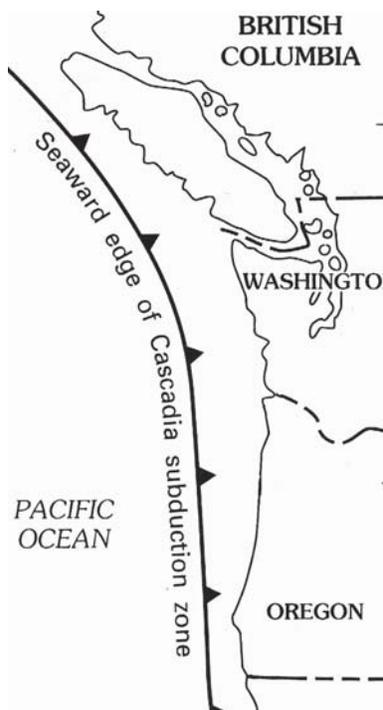
In 2000 an international group of scientists released the first consensus paper on the likelihood, power, and resulting damage from an earthquake in the Cascadia subduction zone lying 30-70 miles off the Oregon coast. The Oregon Department of Geology and Mineral Industries estimates a 10–15 percent chance of a magnitude 9 quake in the next 50 years. An earthquake off Oregon’s coast could shake the ground as far east as the Cascades obliterating thousands of buildings and isolating communities for days or longer, particularly those on the Coast.

Aftershocks would likely be numerous and exceed magnitudes of 7.5. Shaking is likely to occur for 1-3 minutes at magnitude 8. Liquefaction (a phenomenon in which the strength and stiffness of a soil is reduced by earthquake—responsible for tremendous amounts of damage in earthquakes) and landslides would accompany this type of quake. Tsunamis would occur on coastlines. Maximum wave run-up heights may reach close to 36 feet. Wave activity may start within minutes of the quake and will persist for several hours.

MORBIDITY AND MORTALITY

Experience with natural disasters suggests that most morbidity and mortality after an earthquake or a

Diagram of Subduction Zone





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volcanic eruption would be due to injuries. A 1999 preliminary statewide assessment reported that 5,000 Oregonians would die after a serious earthquake. For every death, as many as three persons would require hospitalization, and ten persons would be treated in emergency rooms and released.

In the event of an earthquake or volcanic eruption, Oregonians could experience flash flooding, building collapse, landslides, bridge collapse, electrical hazards, stress, exertion, exposure to the elements and exposure to sharp or otherwise hazardous debris. Leading causes of death are likely to include drowning, cardiac events, multiple trauma, hypothermia, internal injuries, and brain injuries.

Causes of morbidity are likely to include electrocutions, burns, puncture wounds, strains/sprains to the back and neck, soft tissue injuries,

fractures, dislocations, asphyxia, traumatic brain injury, lacerations, exposure, penetrating foreign body injuries, internal organ injuries, and inhalation of gas, smoke or dust.

PREPAREDNESS

Health care providers can help educate patients about the need for preparedness, facilitate medical care for those with chronic diseases and the injured, and advocate for community preparedness to save lives.

The first steps towards preparedness involve understanding that we are at risk. Unlike our brethren in the Southeast, Oregonians do not experience an annual season of natural disasters, and because of the low number of earthquakes and volcanic eruptions, Oregonians may not perceive that they are at real risk.

Once a disaster has occurred health care providers will be important providers of emergency care, as well as health care in shelters or among

evacuees. However, a provider is likely to be able to fulfill those roles only if he or she is comfortable that loved ones are safe and cared for. As critical service providers it will be especially important to make sure your family is prepared.

Healthcare providers also can be important advocates for emergency preparedness in the community. Among other activities, healthcare providers can lend their support to community efforts to retrofit buildings to reduce earthquake damage, ensure a strong EMS and trauma care system that is prepared to function in a disaster, and assist in the development of local hospital emergency preparedness plans.

For additional information on preparedness contact Nan Newell, Ph.D., Manager, Oregon Public Health Preparedness at (971) 673-1314 or nanette.newell@state.or.us

ONLINE RESOURCES

Oregon's official tsunami website. www.oregongeology.com/earthquakes/coastal/tsubrochures.htm

Earthquake and tsunami evacuation route for Oregon coast. www.oregon.gov/OOHS/OEM/tsunami.shtml

Tsunami hazard awareness materials. www.pmel.noaa.gov/tsunami-hazard/tsunami_awareness.htm

"Put together an emergency kit". <http://sarvois.dogami.state.or.us/emergencykit.htm>

What healthcare providers can do:

- Identify critical medication needs and make sure that patients have an adequate supply on hand in case of a disaster.
- Counsel patients to plan what they and their families will do if a disaster occurs.

What patients can do:

- Create emergency kits for home, work, and each car with enough supplies, including food, water and necessary medication, for each member of the family to survive for three days.
- Make plans for evacuation, including moving pets and medically vulnerable or socially isolated family members.
- Involve someone not likely to be affected by a disaster occurring in Oregon in a communication plan to help people stay in touch.
- Store a copy of important documents, including passports, drivers licenses, bank account numbers and insurance information in a safe place so that it can be quickly and easily accessed.