Facts on Fracking:

What healthcare providers need to know

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www.frackingandhealth.org

What is fracking?

Oil and gas companies use High Volume Hydraulic Fracturing, or "fracking", to release natural gas and oil trapped between layers of dense shale rock found deep below the earth's surface. Prior to fracking, gas companies drill vertically for thousands of feet. Drilling then turns horizontally, creating a fracturing path extending up to 5,000 feet underground. When the well is completed, millions of gallons of water, mixed with sand, salts and up to 300 tons of chemicals are pumped into the well at high pressure to break up the shale, releasing the gas and oil. The "flowback" water returning to the surface contains fracking chemicals, highly concentrated salts, oil, grease, heavy metals and naturally occurring radioactive material. Normal water treatment facilities are unable to filter out hazardous chemicals and radiation in flowback water.

Potential Health Effects Related to Fracking

Fracking chemicals are linked to cancer, as well as gastrointestinal, circulatory, respiratory, developmental, and neurological disorders. Storage, treatment and disposal of contaminated water can be a source of human exposure to chemical carcinogens and their precursors.[1] Fracking chemicals have polluted drinking water and air. Reports of health effects to individuals, families, communities and the environment are documented worldwide.

Risks to Health from Contaminated Drinking Water

There have been numerous incidents of drinking water contamination from drilling and fracking operations, mostly involving households using private drinking-water wells. There have been reports of nosebleeds, headaches, and skin lesions in residents living near or drinking well water from near fracking facilities. Drinking water can be contaminated through:

- **Methane migration:** A 2011 study found that private drinking-water wells had on average methane levels **17 times higher** near drilling sites, compared to those in non-drilling sites.[2] High levels of methane in drinking water can create risks for household explosions and asphyxiation.
- **Spills and leaks of fracking chemicals and fluids:** Water contamination has occurred from methane migration, chemical spills, leaks from wastewater holding pits, gasoline and diesel by-products, and radioactive elements brought up from deep underground by the fracking process.[3] These chemicals present risks for neurotoxicity, reproductive problems and cancer.[4] It is important to note that it can be challenging for healthcare providers to learn what specific chemicals are used in a fracking mixture, because gas companies claim proprietary rights on the chemical mixtures used.
- **Radiation:** Naturally occurring radioactive particles, such as radium, barium, and radon, may be brought to the surface in fracking wastewater. Wastewater tests in Pennsylvania and New York found levels 3,600 times more radioactive than federal limits for drinking water and 300 times more radioactive than Nuclear Regulatory Agency limits for nuclear plant discharge.[5] Radiation is a known carcinogen.
- **Mismanagement of Fracking Waste:** Wastewater from fracking operations contains hydrocarbons, heavy metals, salts, and naturally occurring radioactive material. Wastewater may also be reused in another well, re-injected underground,

stored in holding pits, or transported to a treatment facility. Each of these activities carries its own inherent risks, including spills, leaks, earthquakes (in the case of underground injection) and threats to groundwater and surface water. Municipal water treatment facilities are not equipped to handle fracking wastewater.

Water consumption: Large volumes of water used in fracking, up to 5 million gallons per well, can depleted local water supplies. Contaminated by salts, chemicals and radiation, much of the water is permanently removed from the ecosystem when it is injected into deep wells or housed in huge wastewater holding pits for disposal. At a time when much of the U.S. is experiencing drought conditions, this is a tragic waste of our most valuable natural resource.

Risks to Health from Poor Air Quality

There are several sources of air pollution from drilling and fracking operations. Air emissions from shale drilling, gas processing, gas escapes, and diesel exhaust negatively impact air quality. Hazardous air emissions include methane, hydrogen sulfide, elevated particulate matter (PM 2.5) and VOC's (ozone precursors) such as benzene, ethylbenzene, toluene, and mixed xylenes.[6] Ground-level ozone is associated with reduced lung function and exacerbations of asthma and emphysema, while elevated PM is responsible for increased incidences of asthma, cardiovascular disease, chronic obstructive pulmonary disease, premature death in people with preexisting cardiac or respiratory disease, infant mortality, and cancer.[7-12] Those at greatest risk are those with preexisting pulmonary disease, children due to their more rapid breathing rate and developing lungs and immune systems, and pregnant women because of an increased risk of pre-term labor and delivery of a low birth weight infant[13,14] **See Table 1 for pollutants and health impacts**

Other Risks to Health:

Worker Safety: Occupational Hazards

Due to the nature of fracking there is the potential for a number of occupational hazards. These include exposure to an unknown mixture of fracking chemicals and inhalation hazards from silica dust. Inhalation of silica dust is associated with silicosis, a pulmonary disease, and lung cancer.[18] Worker exposure to neurotoxins may impair their job performance and increase likelihood of on the job

injuries. Temporary workers are also common in this industry and they may not familiar with the hazards present or the need for protective equipment. The fatality rates in the oil and gas industry are seven times higher than the national average across all industries.[19]

Recommendations for Healthcare Providers

Prevention of exposures: Clients should be encouraged to test their well water, prior to drilling if possible, and to re-test anytime the gas well is drilled. It is important for clients to follow the guidelines for water sample collection and to test for contaminants associated with fracking, as many of these are not included in typical well water testing. Check water-testing guidelines for your area or go to www.frackingandhealth.org for more information on water testing.

Clients should be instructed to monitor respiratory symptoms and report to their provider if they are short of breath or easily fatigued. If asthmatic, they should monitor their respiratory status using a peak flow meter and keep records of their testing.

Acute exposures: Depending on the exposure pathway, findings may include neurological and respiratory symptoms such as eye and throat irritation, asthma exacerbation from increased ozone levels, dizziness, headaches, fatigue, numbness in the limbs, coordination issues, tremors and at higher exposures syncope. Noise related symptoms include hearing loss, sleep disturbance, increased blood pressure, decreased task performance, annoyance and irritability.

There are several assessment tools that providers can utilize to assess for symptoms related to fracking. An example of a tool can be found here: http://bit.ly/NigzhQ

Table 1. Select pollutants associated with fracking and health effects

Pollutant	What is it?	Health Effect
Methane	Natural gas, can leak out of wells into the air and water, has no odor	When trapped in a house, can cause explosion & asphyxiation.
Hydrogen Sulfide	May be found in natural gas and can leak out during fracking process, has a rotten egg odor at low levels in the air	Low levels= lung irritation - coughing, tears from the eyes, skin irritation, dizziness, headache. High levels= odor goes away, difficulty breathing, unconsciousness, and even death.
Volatile Organic Compounds (VOC's)	Are found in the fluids used for fracking and can leak out during fracking process. These include chemicals such as benzene, ethylbenzene, toluene, & mixed xylenes.	Respiratory issues, eye and skin irritation, nausea, vomiting, dizziness. VOC's can mix with diesel fumes to make ozone (see below).
Particulate matter (PM 2.5)	PM 2.5 are small pieces of pollution in the air that can be found near roads, dusty areas, or in smoke.	When these are breathed in, they can get stuck in the lungs and cause problems. These include asthma, heart disease, chronic obstructive pulmonary disease (COPD), premature death and cancer. It can also increase the chance of premature birth, fetal growth restriction, and infant mortality.
Ground level ozone (smog)	Ozone is made when VOCs mix with nitrogen oxide (a chemical found near fracking operations and in diesel exhaust).	When ozone is breathed in, it can cause problems breathing and worsen asthma and emphysema. Children and pregnant women are at greatest risk for having problems.

Chemicals used in fracking are a proprietary mixture so data on specific chemicals used at a particular location may be difficult to obtain. Providers can request a list of chemicals used at the gas operation that the patient may have been exposed to, but some states have a 'gag rule' that prevents them from sharing that information with the patient or other healthcare providers. This interferes with the patient-provider relationship and impedes medical care. The website www.FracFocus.com lists some fracking wells and the chemicals used there. Federal law does not require the disclosure of chemicals used in fracking operations.

Occupational exposures: Patients who are working in the oil and gas industry may present with the above symptoms on a more severe basis. Be aware that gas field employee may have received treatment for exposures through their company's occupational health services. If they have, the treatment should be assessed and documented.

Community health: Healthcare providers have an important role to play in their communities, across the continuum of the fracking process. Providers can facilitate community assessments of air, land, and water and provide education on the possible health impacts from fracking. Providers should also report exposures and health impacts to the state or local health department so that fracking related health impacts can be tracked.

Health policy: There are many opportunities for healthcare providers to engage policy makers on this issue related to health impacts of fracking. Currently, the fracking industry is exempt from federal regulations such as the Clean Air Act and the Clean Water Act. Health care providers can support stronger federal and state regulations of fracking waste water, private well drinking water, air quality, and making the mixtures of chemicals used in fracking publicly available. The American Nurses Association has called for a moratorium on new fracked wells until public health can be assured.

The public health voice is very important as policy debates move forward in many states. Opportunities include writing and visiting with legislators, being a part of state or local fracking commissions, and providing testimony at local hearings. Also, in states with provider "gag rules" about proprietary

chemicals, health care providers can advocate for the lifting of these restrictions.

Nursing & public health professional organizations call for caution on fracking operations

The **American Nurses Association** passed a Resolution in 2012, calling for nurses to :

> *"Collaborate with others in calling for a national moratorium on new permits for unconventional oil and natural gas extraction (fracking) throughout the country until human and ecological safety can be ensured."*

The **American Public Health Association** recently issued a position statement on fracking that reviews risks and makes recommendations. Among them are the recommendation for:

> *"Federal, state, and local environment, health, and development agencies should adopt a precautionary and adaptive approach in the face of uncertainty regarding the long-term environmental health impacts of high-volume hydraulic fracturing (HVHF)."*

Resources:

For a complete list of resources including online databases of fracking chemicals, assessment tools, peer-reviewed references, and more go to: www.frackingandhealth.org

- Southwest Pennsylvania Environmental Health Project (SWPA-EHP): http://bit.ly/ZiR0Zv/
- APHA Policy Statement: Hydraulic Fracturing of Unconventional Gas Reserves http://bit.ly/TYv13W
- U.S. Department of Labor, Occupational Safety & Health Administration (OSHA): To report a worker emergency, fatality, or imminent life threatening situation immediately to OSHA, Call: 1-800-321-OSHA (6742) or TTY 1-877-889-5627

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