ASTHO Brief
Exploring critical issues in state and territorial public health.
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Per- and Polyfluoroalkyl Substances: Contaminants of Emerging Concern

Background and Public Health Significance

Per- and polyfluoroalkyl substances (PFAS) are a group of several thousand synthetic compounds that are found in a wide range of commodities. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are two of the most regularly investigated PFAS. According to the Agency for Toxic Substances and Disease Registry (ATSDR), PFAS are found "in nonstick cookware, water-repellent clothing, stain resistant fabrics and carpets, some cosmetics, some firefighting foams, and products that resist grease, water, and oil." Their ability to resist various stressors, such as heat and water, make them particularly resilient to natural degradation processes in the environment.

Humans can come into contact with PFAS through multiple exposure sources. Contaminated drinking water is often the most discussed source, but people can also be exposed through other pathways, such as utilizing nonstick cookware and ingesting fish with PFAS built up in its tissues. EPA has concluded that "most people have been exposed to PFAS." The Interstate Technology and Regulatory Council reports that in the environment, "there are four major sources of PFAS: fire training/fire response sites, industrial sites, landfills, and wastewater treatment plants/biosolids." Individuals and families living near these sources could have an elevated risk of exposure to various types of PFAS. ATSDR is currently assisting over 40 U.S. communities with PFAS issues.

ATSDR reports that some investigations have shown that several PFAS may affect various aspects of children's development, affect female fertility, impact the immune and hormonal systems, contribute to elevated cholesterol levels, and amplify the risk of cancer. ATSDR acknowledges that additional studies are needed on PFAS toxicity and human health effects.

Relevant PFAS Challenges for State Health Agencies

Differing Guidance, Advisory, and Regulatory Values
With thousands of different PFAS manufactured over time, it is not feasible to have a deep understanding of each chemical's potential for negative health impacts. Furthermore, differing health advisory, guidance, or regulatory values between state and federal health agencies make it difficult for the public to know what drinking water levels are considered safe for individual PFAS compounds.

There can be differences in how agencies evaluate studies on PFAS, which can help explain the variety of drinking water values between agencies. Sometimes, agencies may utilize different key studies to help choose and evaluate the most sensitive health endpoint(s) used to develop a toxicity value. They may also choose different exposure factor inputs during the calculations of these various drinking water values. For instance, EPA's 2016 health advisories for PFOA and PFOS in drinking water state that "when both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 parts per trillion health advisory level." The Connecticut Department of Public Health acknowledges EPA's 2016 health advisory, but also sets its own "drinking water action level," which sets a limit for five combined PFAS chemicals, including PFOA and PFOS.

More recently, the Michigan Department of Health and Human Services set "public health drinking water screening levels" for PFOA and PFOS at levels lower than EPA's 2016 health advisory. The agency also set screening levels for perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), and perfluorobutane sulfonic acid (PFBS). In 2018, New Jersey passed a legally enforceable maximum contaminant level (MCL) for PFNA, the first for any PFAS in any state. Since then, New Hampshire has established legally enforceable MCLs for PFOA and PFOS below EPA's 2016 health advisory values. MCLs were also established for PFNA and PFHxS.

These differing drinking water values between states and federal agencies and the toxicity knowledge gaps present a risk communication challenge to state health officials who field public inquiries about PFAS contamination and human exposures. Federal regulatory standards, such as EPA-established MCLs, could help by giving all states a minimum regulatory threshold for certain PFAS. However, it is not feasible to go through the formal rulemaking process for each PFAS chemical.

Exposures and Associated Health Effects

Many communities near sites of PFAS contamination request biomonitoring investigations, such as blood tests, to shed light on their individual exposures. Because the health effects of PFAS exposures are still being studied, state health agencies can be put in the difficult position of interpreting an individual's biomonitoring results and addressing questions about the correlation between these results and past, current, or future health issues. However, if a specific PFAS exposure source in a community is identified, such as private well water contamination stemming from a nearby industrial site, biomonitoring results can be a useful tool for state health agencies to identify who has been exposed and educate them on strategies to reduce their exposures.

Recent Federal Actions to Protect Communities from PFAS Chemicals

In February 2019, EPA released its action plan of measures intended to protect the public's health from PFAS exposures. Examples include finalizing draft toxicity values for PFBS and GenX, releasing a regulatory determination for creating a legally enforceable MCL for PFOA and PFOS, and creating a risk communication toolbox. ATSDR released a draft toxicological profile for perfluoroalkyls for public comment and published the PFAS Exposure Assessment Technical Tools, an eight-step protocol for assessing a community's exposure to specific PFAS compounds through drinking water. CDC/ATSDR is using the protocol as a foundation to conduct exposure assessments in communities across the United States. CDC/ATSDR also announced seven research cooperative agreements that will investigate how wide ranging PFAS exposures affect human health in communities with drinking water exposures.

Conclusion

Environmental PFAS contamination and the health risks associated with human exposures are concerns that state and territorial health officials will be facing for years to come. These issues can only be addressed by close coordination between stakeholders at all levels of government, academia, the private sector, and the general public. Local, state, and federal public health and environmental protection and quality agencies will need to work closely together to provide prompt, accurate, and consistent information to affected communities and other stakeholders. As new information regarding PFAS emerges, health officials at all jurisdictional levels will continue to provide community members and other relevant stakeholders with easy to understand, accurate updates to ensure appropriate responses to safeguard public health.