Assignment Description

The Fellow will primarily work within the Division of Environmental Health (EH). EH aims to prevent illness or disease that may be caused by environmental threats, both natural and human-made, and to reduce or eliminate harmful environmental exposures. Staff achieve this mission by applying sound science and regulation to assess and minimize risk. The Division is home to 12 program areas including asbestos and lead regulation, childhood lead poisoning prevention, climate & health, drinking water, environmental surveillance, food and lodging, recreational water, and toxicology. EH staff members have skills in a variety of areas including epidemiologic methods, data management, risk assessment, program management, and engaging with the public, creating a well-rounded environment for a Fellow to learn and grow within.

In recent years, the Division has been involved with responding to the discovery of Perfluorooctanoic Acid (PFOA) in well water in the community of Bennington, assisting schools with lead and radon testing, monitoring for cyanobacteria blooms in surface waters in the summer, and establishing a chemical disclosure program for children's products.

The Fellow will have opportunities to engage with and analytically support many of EH’s program areas, including childhood lead poisoning, climate & health, environmental surveillance, food and lodging, and toxicology.

In addition to EH-related work, the Fellow will also contribute to injury prevention projects. The Injury Prevention program is housed within the Division of Emergency Preparedness, Response, and Injury Prevention (DEPRIP). Currently injury prevention programming focuses on older adult fall prevention, pedestrian safety, traumatic brain injury prevention, and suicide prevention. The program coordinates a statewide advisory group and provides technical assistance to a number of state coalitions. The Fellow will primarily contribute to pedestrian safety and suicide prevention work but will also have opportunities to engage in other injury prevention program areas.

Day-to-Day Activities

When the Fellow arrives, they will work with their mentors to create a work plan that supports Division needs, but also allows for flexibility, exploration of areas of interest, and timely achievement of fellowship competencies. The level of challenge of submitted projects can be adjusted to meet the Fellow’s current skill level, as well as to create opportunities for growth.

The Fellow should anticipate variety in their day to day activities. They will be responsible for conducting literature reviews in order to determine methodologically appropriate ways to approach a given project, cleaning and managing data, writing code, analyzing data, and communicating findings (both orally and in writing). On occasion, the Fellow may be asked for help interpreting epidemiologic
studies by EH or Injury Prevention program staff. The Fellow should also be willing to respond to needs and/or emergencies as they arise and to work collaboratively across the Health Department.

Opportunities for professional development include leading or participating in epidemiology journal club discussions at the Health Department, attendance at regional or national conferences (Northeast Epidemiology, CSTE Annual Conference, Vermont Emergency Preparedness Conference), participation in CDC grantee calls and webinars, as well as exposure to leadership decisions and policy making at the Health Department.

**Potential Projects**

**Surveillance Activity Exploring Relationships between Pollen Counts and Exacerbation of Chronic Respiratory Conditions**

Pollen allows plants to reproduce, but can also cause health concerns, particularly for people with allergies, asthma and other respiratory conditions. According to the Centers for Disease Control and Prevention, allergies are the 6th leading cause of chronic illness in the U.S., affecting more than 50 million Americans each year. Most people with asthma also suffer from allergies, and pollen can trigger an allergy-related asthma attack. Vermont has the 5th highest prevalence of asthma in the U.S. affecting 12% of adults and 7% of children.

EH has obtained 10 years of pollen count data from a local allergy clinic and also has access to hospital discharge and syndromic surveillance data. The Fellow will be responsible for assessing potential relationships between increased counts of tree, weed, or grass pollen and subsequent increases in emergency department utilization for asthma and chronic obstructive pulmonary disease. Additional factors to consider include meteorological data, such as precipitation and wind direction.

**Surveillance Evaluation Evaluate the Ability of the Vermont Agency of Transportation’s CRASH Database to Identify Factors Related to Pedestrian-Involved Crashes**

Vermont is ranked 11th in the country for pedestrian fatalities, 10% of which involve children under the age of 16 and 20% of which involved adults over the age of 70. The Health Department developed a pedestrian safety program in 2017 centered on education and behavior change strategies. Evaluating the Agency of Transportation’s CRASH data system as a pedestrian injury surveillance system is an important next step in directing pedestrian safety program objectives.

The CRASH data system includes all reports submitted to the State of Vermont for crashes involving motorized vehicles on all public highways. The Fellow will evaluate CRASH as an injury surveillance system for incidents involving pedestrians and other vulnerable users (cyclists, people who use wheelchairs), as well as for its utility in identifying the factors that contribute to pedestrian-involved incidents (speed, distracted or impaired driving).

This evaluation will help to improve the completeness and quality of data collection to better inform Health Department pedestrian safety program activities.
**Major Project  Climate Impacts on Water Quality and Related Illnesses in Vermont**

Water resources (used for drinking, recreation, irrigation, and other purposes) can become contaminated by a wide variety of pathogens, chemicals, pharmaceuticals, and other toxic materials. Contamination sources include wastewater and home septic systems, domestic and wild animals and their waste products, pesticides and herbicides, and chemicals and fuels used in urban and industrial environments. Other contaminants may be found naturally in the environment. Both heavy precipitation and drought can increase the risk for contamination of surface and ground water. Continued warming and changes in precipitation patterns as a result of climate change are expected to increase the risk for water contamination and associated disease.

The fellow will be responsible for utilizing historic weather data, drinking water quality data (public water systems and private wells), recreational water quality data, and reportable disease data to assess the impacts of temperature and precipitation patterns on the contamination of water sources and subsequent outbreaks of diseases like cryptosporidiosis and giardiasis. Once the historic relationship between these factors has been established, climate projection data will be used to assess potential increases in water contamination events and waterborne disease outbreaks in the future. The fellow will also explore using geospatial risk factor data to identify and map locations in Vermont that may be particularly vulnerable to climate-related impacts on water quality.

**Surveillance Activity  Investigate the Relationship between Substance Use and Self-Harm**

Suicide was the eighth leading cause of death among Vermont residents in 2016 and the tenth leading cause of death in the United States in 2016. Rates of death by suicide increased steadily in Vermont from 12.9 per 100,000 in 2012 to 18.3 per 100,000 in 2017, although this change was not statistically significant.

Risk factors for suicide include depression and other mental health diagnoses as well as substance use disorder, often in combination with another mental health diagnosis. More than 90% of people who die by suicide have these risk factors. Several recent studies have indicated that there is a higher percentage of suicide-related opioid overdoses than previously thought, included one that cites preliminary work suggesting that 22 to 37 percent of opioid-related overdoses are, in fact, suicides or suicide attempts.

The CSTE Fellow will utilize multiple data sources to investigate the relationship between substance abuse, specifically opioid use and self-harm/suicidality. The Fellow will work closely with data managers to access key data sets in the Health Department including Emergency Medical Services data and the Vermont Uniform Hospital Discharge Data Set.

Using findings from the initial analysis of overdose (opioid) and self-harm data, the Fellow will work to meet several objectives.

The Fellow will utilize their findings to help program managers better understand underlying risk and protective factors, determine appropriate prevention strategies, inform policy, and develop approaches to prevention. The Fellow will have the opportunity to work with other state departments and community partners to inform the development of appropriate public health messaging and communications around the topic of mental health seeking including self-harm and suicide.
Additional Project: Chloride and Galvanic Corrosion of Lead in Private Drinking Water in Vermont

There is growing evidence that deicing salt, in the form of sodium chloride, is impacting groundwater across Vermont. Increases in chloride in groundwater can lead to an increase in the chloride to sulfate mass ratio (Cl/\text{SO}_4), which raises the potential for water to become more corrosive and to leach lead and copper from plumbing. Lead in drinking water is highly toxic and can cause serious and permanent health problems. Too much lead in the body, or lead poisoning, can damage the brain, kidneys and nervous system.

Based on Vermont specific chloride in groundwater and housing stock data, the Fellow will identify representative sites for testing of lead in drinking water. Once the representative areas are identified, the Fellow will coordinate enrollment of private well owners within the designated areas in the study. Once the homes are identified, the Fellow will work with EH’s Senior Drinking Water Engineer to put together a sampling plan. The water sampling will include lead first draw and flush lead, pH, chloride and sulfate testing. The samples will be returned to the Public Health Lab for analysis.

The Fellow will be responsible for analyzing the data to assess the effect of chloride on lead in drinking water and reporting on the findings.

Preparedness Role

All Health Department staff take basic Incident Command System (ICS) training in order to be prepared to participate in emergency response activities. The fellow will have the opportunity to participate in trainings and exercises that occur throughout the year, including a full-scale exercise that is planned for the end of 2020.

The fellow will also be encouraged to participate in real time incidents as they arise. Previous CSTE fellows at the Vermont Department of Health have played a role in responding to foodborne illness outbreaks, contamination of drinking water with perfluorooctanoic acid (PFOA), and the production of ricin at a retirement community.

Additional Activities

Implementation of Routine Trend Detection within Environmental Public Health Tracking Datasets (Additional Project): While intended to be an environmental surveillance program, the Environmental Public Health Tracking program in Vermont currently functions more as a data warehouse/access point to environmental and health outcome data. Program staff have identified this as an area for improvement and have begun to explore the use of the National Cancer Institute’s Joinpoint Regression software to analyze data for statistically significant changes in trend over time. The Fellow will contribute to this effort by exploring the feasibility of conducting subgroup analyses using this software (are changes in trend different for males vs. females, between counties), identify a method for automating dataset preparation, and developing a protocol for determining when a change in trend is concerning and should therefore be shared with the public.
Assessing Knowledge and Perceptions of Cyanobacteria in Vermont (Additional Project): Cyanobacteria, sometimes called blue-green algae, are relatively simple, primitive life forms closely related to bacteria. They are found throughout the world in terrestrial, freshwater, and marine habitats. Nutrient-rich bodies of water may support the rapid growth of cyanobacteria, commonly referred to as blooms. Cyanobacteria cannot maintain this abnormally high population for long and will rapidly die, sometimes releasing toxins in the process. Exposure to these toxins can cause allergic type reactions (runny nose, sore throat, skin irritation) or gastrointestinal symptoms in humans.

The Health Department conducted an online survey of 600 Vermonters to better understand the knowledge and perceptions that Vermonters have about cyanobacteria. The survey touched on questions of awareness, perceived harmfulness, knowledge, current behaviors, actions that could be taken, sources of information, and demographics. The Fellow will analyze this dataset to come up with the key takeaways, including messages the Health Department should focus on disseminating, and which groups should be targeted with this messaging.

Prioritization of Chemicals of High Concern to Children (Additional Project): Manufacturers are required to submit disclosures to the Department when their children’s products contain Chemicals of High Concern to Children (CHCC). The CHCC list is established in statute and evaluated every two years for addition or removal of chemicals. The data that is submitted to the Department includes the brand name and product model of the children’s product, as well as the chemical function, component, concentration, and brick description. The Fellow will contribute to an ongoing effort to determine the best method for combining these datasets, as well as be responsible for further analyses of these data in order to prioritize CHCC that present the greatest risk to children.

Incorporate Additional Climate-Related Health and Environmental Indicators into the Environmental Public Health Tracking Data Explorer (Additional Project): We plan to enhance the Data Explorer with additional indicators that will help communities to identify locally relevant risks and link users to guidance on adaptation considerations for each risk. Potential indicators may include climate change indicators (e.g., number of hot days per year, number of heavy precipitation events per year, drought conditions, average annual temperature, etc.), climate-related health impacts (e.g., water contamination, airborne allergy impacts, cold-related illness, etc.), and health-benefiting greenhouse gas mitigation activities (e.g., number of homes weatherized per year, electric vehicle registrations, percent of population using transit, walking, or biking, etc.).

Participate in Foodborne Illness Outbreak Investigations: The Vermont Department of Health’s Food and Lodging program is housed in Environmental Health and headed by a former CSTE fellow. The current fellow will have the opportunity to take part in investigations of foodborne illness outbreaks and perform site visits of restaurants and lodging establishments with state health inspectors.

Lead Epidemiology Journal Club Discussions: The fellow will have the opportunity to lead monthly journal club discussions relevant to the Division of Environmental Health, as well as those that might be of methodological interest to epidemiologists within the department as a whole. These serve as an important opportunity for staff within the department to stay up to date on the state of the science in different areas of concern. Past journal clubs have involved a wide variety of subject matter, including childhood cancer risk in areas near Chernobyl, fetal neurological effects of exposure to fluoride in drinking water, and many others.
Collaborate on State Epidemiological Efforts: Additional state epidemiological opportunities will be identified based on the fellow's interests. For example, participation in the Health Department's Survey Review Committee which ensures survey instruments are robustly designed and anticipate data analysis needs.

Green Team: The Green Team is a group of Vermont Department of Health employees who work to enhance environmental stewardship within our worksite. Our goal is to educate our colleagues about sustainability initiatives, work closely with leadership and Operations to implement eco-friendly systems, and make connections between our work as public health professionals and environmental health. In recent years, the Green Team has assisted with the roll out of composting at the Health Department, sponsored an Active Transportation Awareness week, and hosted workshops on composting and recycling.

Publish, Present, and Training: The Fellow will have ample opportunities to present to national, state and community-based groups and coalitions and to publish work conducted during the Fellowship. The Fellow also will have the opportunity to attend local and community-based offerings, state and national conferences, meetings, and training opportunities as part of this fellowship.

Mentors

Primary
Lori Cragin, PhD, MS
Division Director & State Epidemiologist for Environmental Health,

Secondary
Lauren Prinzing, MPH
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