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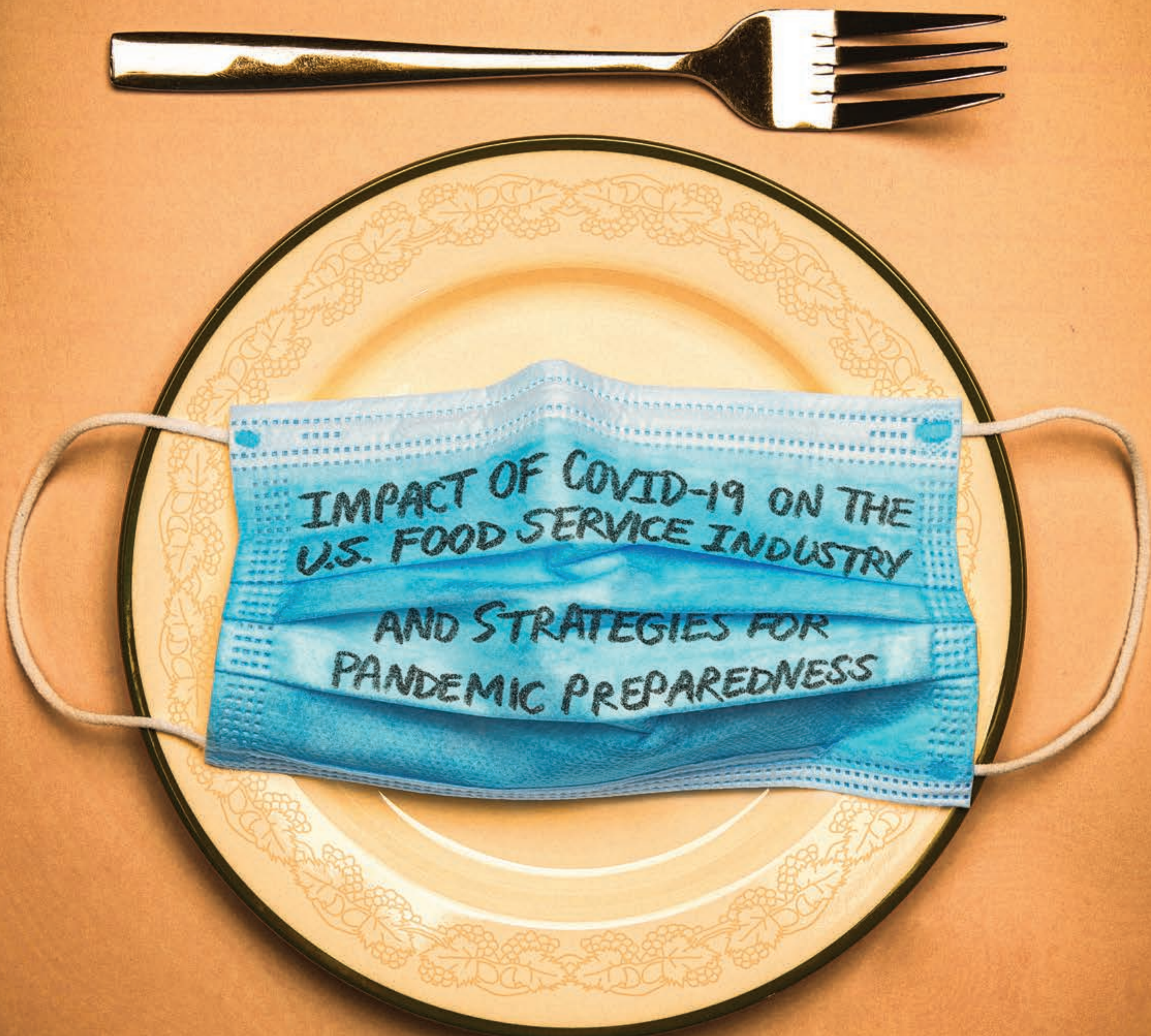

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ABOUT THE COVER

Even as we continue to deal with the current COVID-19 pandemic, we need to prepare for future pandemics. The purpose of the special report featured on this month's cover, "Impact of COVID-19 on the United States Food Service Industry and Science-Based Strategies for Pandemic Preparedness," is to document the impact of COVID-19 on the food service industry and provide strategies based on empirical evidence and suggestions for future preparedness. As we prepare for the next pandemic or emergency, having a rigorous plan to deal with different biological hazards across multiple organizational levels will help with preparedness and the speed of implementation.

See page 8.

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Erratum

In the May 2021 *Journal of Environmental Health* (volume 83, number 9), the Direct From CDC/Environmental Health Services column, "2021 Model Aquatic Health Code (4th Edition)" by M.C. Hlavsa, J.P. Laco, V.R. Hill, and P.A. Sheehan, incorrectly stated that Chapter 5 and Chapter 6 of the Model Aquatic Health Code would likely be adopted into the International Swimming Pool and Spa Code in 2021. The correct year for that possible adoption is 2024. This correction was made to the electronic version of the issue but print versions have the incorrect year listed.

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PRESIDENT'S MESSAGE

Sandra Long, REHS, RS

Reflections

How did the year go by so quickly? I cannot believe this column is my final one as president of the National Environmental Health Association (NEHA). First, let me tell you again how privileged and honored I feel to have served as NEHA president. It has been an interesting year and it is bittersweet as I write this column.

While I had plans for certain accomplishments during my presidency, like everyone, plans were changed as we focused on the pandemic. COVID-19 dominated our lives, our plans, and the way we function. We have all learned new skills, discovered new strengths, and developed new outlooks.

COVID-19 resulted in a focus on food safety, emergency preparedness, and the function of the environmental health profession. These are three subjects I feel very strongly about and were part of my goals. With the closing of restaurants and an emphasis on to-go foods and food establishments being creative with raw ingredient meal boxes, we faced new challenges. Rising to this challenge, food safety information was communicated to both food establishments and consumers to keep the food safe. NEHA's participation in National Food Safety Education Month in September 2020 (www.neha.org/neha-celebrates-national-food-safety-education-month) was an opportunity to emphasize these safety measures.

This entire year has been an exercise in emergency preparedness and management plans. We have all learned not only what was missing from our plans but also how quickly plans can be adapted to accommodate current situations. We learned the value of keeping emergency preparedness plans current. We were able to stress the importance of environmental health as part of emergency management during National Preparedness Month in September 2020 (www.neha.org/neha-supports-national-preparedness-month).

> *I have always been proud to be an environmental health professional and have taken every opportunity to promote the profession.*

As environmental health professionals, we have been on the front lines of the pandemic. We have been performing contact tracing, ensuring protocols are being met, and organizing and participating in vaccination clinics and countless other duties resulting from the pandemic, in addition to our daily functions. I cannot tell how proud I am of each of you. In recognition of World Environmental Health Day on September 26, 2020, NEHA authored a declaration of support, with partner input, that was signed by over 30 national and international organizations (www.neha.org/world-environmental-health-day-2020). This type of support is empowering. I have always been proud to be an environmental health professional and have taken every opportunity to promote the profession and emphasize the importance of environmental health. I hope each of you takes the opportunity to do the same.

This past year we have all gained so many new skills. Although some of these skills may have been gained involuntarily, we learned to adapt, preserver, and manage our situations. We have gained additional computer, communication, and home office skills. We have all had to learn various online platforms for meetings and seminars as we have adapted to our world suddenly becoming virtual.

I would like to think of this past year as a year of firsts—firsts that will have a positive influence on the future because of the lessons we have learned and experiences we have gained. While we are all disappointed that we will not be meeting face-to-face for the NEHA 2021 Annual Educational Conference (AEC) & Exhibition, it is the first time that the NEHA AEC will be held virtually. This opportunity will hopefully enable members who might not have attended a face-to-face AEC to be able to join us virtually. With a lower registration cost and cost savings on travel, meals, and lodging, the 2021 AEC Three-Part Virtual Series is an opportunity for many to attend for possibly the first time. There is still the ability to meet with vendors and connect with those you are familiar with, as well as meet and make new contacts.

For the majority of us, it is our first time through a pandemic, which provides us with the opportunity to document our findings and procedures, and memorialize the event for others to learn from. Due to COVID-19, the NEHA Board of Directors has not met in-person since January 2020, has not traveled to affiliate conferences, and has not been able to meet members in-person. As officers and board members, however, we have been able to participate virtually in conferences and meetings. We were able to attend more events than usual virtually due to a lack of scheduling, time, and cost constraints that exist with in-person events. While we miss the comradery face-to-face meetings provide, we know this situation is temporary and know we will be attending face-to-face meetings and conferences in the future.

Serving as NEHA president has been a rewarding experience. I would like to thank everyone who has provided support. To name everyone would be too long so I will simply say, "Thank you," to all who know me, have met with me, have contacted me, or have silently supported me.

My chapter is ending but another will begin with the ascension of Roy Kroeger as 2021–2022 NEHA president in July at the close of the NEHA AEC. Roy and I have served together on the NEHA Board of Directors for many years and I know he will serve NEHA with thoughtfulness, respect, and clarity. He will continue the One NEHA philosophy that I have supported and that was supported prior to my presidency by Immediate Past-President Dr. Priscilla Oliver.

A heartfelt thank you to our members for all your hard work every day as environmental health professionals. I encourage you to continue learning so that you will always be the best informed and educated professional.

Sandra Long

President@neha.org

SUPPORT THE NEHA ENDOWMENT FOUNDATION

The NEHA Endowment Foundation was established to enable NEHA to do more for the environmental health profession than its annual budget might allow. Special projects and programs supported by the foundation will be carried out for the sole purpose of advancing the profession and its practitioners.

Individuals who have contributed to the foundation are listed below by club category. These listings are based on what people have actually donated to the foundation—not what they have pledged. Names will be published under the appropriate category for 1 year; additional contributions will move individuals to a different category in the following year(s). For each of the categories, there are a number of ways NEHA recognizes and thanks contributors to the foundation. If you are interested in contributing to the Endowment Foundation, please call NEHA at (303) 756-9090. You can also donate online at www.neha.org/about-neha/donate.

Thank you.

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SPECIAL REPORT

Impact of COVID-19 on the United States Food Service Industry and Science-Based Strategies for Pandemic Preparedness

Sujata A. Sirsat, PhD
Conrad N. Hilton College of Hotel and Restaurant Management, University of Houston

Abstract **Epidemiologists suggest that even as we deal with the current COVID-19 crisis, we also prepare for future pandemics. The purpose of this special report is to document the impact of COVID-19 on the food service industry, as well as provide strategies based on empirical evidence and suggestions for future preparedness. Studies have found a need for increased emphasis on specific arenas within the food service industry: 1) cleaning and sanitation of fomites such as doorknobs, menus, and table surfaces, 2) rigorous hand-washing and mask-wearing practices to decrease transmissibility of the virus, 3) effective ventilation within operations, and 4) empathetic leadership to enhance resiliency as food service operations across the country cope and work toward reopening. From the practitioner's standpoint, clear and effective communication is key for working with food service operations. The importance of social distancing and mask wearing has been documented using science-based evidence; however, the ways in which these measures are enforced in food service establishments vary across counties and cities within each state, leading to confusion and frustration. As we prepare for the next pandemic, having a rigorous plan to deal with different biological hazards across multiple organizational levels will help with preparedness and the speed of implementation.**

Introduction

Public health experts and epidemiologists have been warning global leaders of the risk of a pandemic—not if, but when (de Jong et al., 1997; Gates, 2015). The coronavirus disease 2019 (COVID-19) pandemic occurred a little over 100 years after the 1918 influenza pandemic; however, experts warn that the next pandemic could occur in the next 20 years (Crespin, 2020). During a human-made or natural disaster, the world and communities come together to provide solidarity, support systems, and aid; however, in the absence of a crisis, there can be a failure to plan effectively for a future disaster (Crespin, 2020).

Planning for a pandemic is complex and involves global agencies (e.g., the World Health Organization), governments across the world, state agencies, local governments (cities and counties), industries, organizations, school districts, and universities, to name a few. Pandemic preparedness is a complicated, long, and expensive process requiring risk assessment skills for different types of hazards and a way for countries to work together as a cohesive unit against these potential hazards. Considering the impact on lives, number of deaths, loss of livelihood, and effect on every country's economy, however, a proactive approach in pandemic preparedness is vital. At the food service level, robust food safety training and retraining, leadership with a high emotional quotient, infrastructure, and a solid work culture are essential to success in the planning phase (de Freitas & Stedefeldt, 2020).

The focus of this special report is to: 1) discuss the novel coronavirus (SARS-CoV-2) that caused the COVID-19 pandemic, 2) document the impact of COVID-19 on the food service industry, 3) discuss specific research and empirical evidence that can be applied to the food service industry, and 4) identify future strategies for the industry and practitioners.

SARS-CoV-2 Mode of Transmission and COVID-19

Coronaviruses are zoonotic pathogens that belong to the family *Coronaviridae* (Habibzadeh & Stoneman, 2020). Coronaviruses typically result in respiratory and enteric infections and affect both animals and humans.

These viruses were not considered a significant health risk for humans until the severe acute respiratory syndrome (SARS-CoV) outbreak in 2002–2003 in China (Drosten et al., 2003; Ksiazek et al., 2003; Zhong et al., 2003) and the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in Middle Eastern countries in 2012 (Zaki et al., 2012).

The novel coronavirus, SARS-CoV-2, that causes the disease COVID-19 likely first originated in livestock farms in southeast Asia in 2019 (World Health Organization [WHO], 2021a). Since then, SARS-CoV-2 has spread via humans throughout the world and on March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic, the first caused by a coronavirus (WHO, 2021b). SARS-CoV-2 stands for severe acute respiratory syndrome coronavirus 2 (WHO, 2021c), and the virus shares a majority of its genetic sequence with coronaviruses found in bats. As of March 2021, WHO has noted that the transmission of SARS-CoV-2 to humans likely involved an intermediary host species that could have included mink, pangolins, rabbits, cats, or racoon dogs (Guan et al., 2003; Lu et al., 2020, WHO, 2021a).

SARS-CoV-2 is transmitted via respiratory droplets (>5 nm) that can travel up to a 3-ft distance (WHO, 2021d). In July 2020, WHO issued a statement that SARS-CoV-2 can linger in the air, particularly in crowded indoor spaces with poor ventilation, and lead to airborne transmission in these circumstances (WHO, 2021e). Studies have shown that asymptomatic persons account for approximately 40–45% of SARS-CoV-2 infections and could transmit the virus for longer than 14 days, highlighting the need for robust testing (Oran & Topol, 2020).

The most common symptoms of the disease typically appear 2–14 days after exposure and include fever, chills, cough, difficulty breathing, fatigue, muscle aches, and headaches (Centers for Disease Control and Prevention [CDC], 2021). In addition, health officials also have recorded symptoms such as loss of taste (Gautier & Ravussin, 2020) and diarrhea (D'Amico et al., 2020). As of May 3, 2021, there have been 153 million cases of COVID-19 resulting in 3.2 million deaths globally. In the U.S., there have been 32.4 million cases resulting in 577,314 deaths (Johns Hopkins University, 2021).

Effect of the COVID-19 Pandemic on the Food Service Industry

The food service industry comprises operations that serve meals and/or snacks for immediate consumption on site, also called food away from home (U.S. Department of Agriculture [USDA], 2020). These commercial food service establishments include full-service and fast food restaurants, cafeterias, and caterers (Edwards, 2013; USDA, 2020). Some food service establishments are located in facilities that do not provide meals and snacks primarily (e.g., lodging, recreational facilities, and retail stores) (USDA, 2020). Full-service and fast food restaurants are the two largest segments of the commercial food service market and accounted for >73% of food-away-from-home sales in 2019 (USDA, 2020). Schools and nursing homes are classified as noncommercial food service establishments, also called institutional food service facilities (Edwards, 2013; USDA, 2020).

The National Restaurant Association (2019) reported that restaurants are the second largest private sector industry in the U.S. and provide jobs for 1 in 10 people in the U.S. The food service industry is fiercely competitive and studies have demonstrated that approximately 30% of restaurants fail during their first year of operation (Parsa et al., 2005). The majority of employees within the food service industry are part-time, often female, students, and documented or undocumented immigrants (Edwards, 2013). There is an expectation of long working hours, low employee pay, and a high turnover rate (Edwards, 2013).

The food industry has been particularly affected by the COVID-19 pandemic and many food service operations around the country have absorbed the impact of COVID-19 by pivoting exclusively to to-go and delivery options (Bartik et al., 2020; del Rio-Chanona et al., 2020). At the beginning of 2020, 1 out of 10 working Texans had a job in the food service industry (University of Houston Hobby School of Public Affairs, 2021). One study surveyed 340 Texas-based restaurant and bar owners who owned a total of 1,342 establishments and employed 44,910 Texans as of March 1, 2020. The survey was conducted between April 8 and April 22, 2020. The self-reported results showed that 90% of owners said that sales dropped between March 23 and April 6, 2020. Almost 80% of the owners laid off some employees and 86% cut worker hours. Some owners (41%) closed one or more restaurants and 19% permanently closed one or more locations (University of Houston Hobby School of Public Affairs, 2021).

The restaurants that stayed in business pivoted to takeout and delivery options only. Eating and drinking places are the primary component of the U.S restaurant and food service industry, generating >75% of total restaurant and food service sales before the COVID-19 pandemic (National Restaurant Association, 2020). The National Restaurant Association (2021) reported that restaurant industry sales in 2020 were down $240 billion from previously expected levels and 110,000 restaurant locations were temporarily or permanently closed.

Science-Based Strategies for the Food Service Industry Moving Forward

Risk of Transmissibility of SARS-CoV-2 Varies Depending on the Environment

Even though the primary mode of transmission of SARS-CoV-2 is via respiratory droplets, WHO has determined that airborne transmission (smaller droplets and particles, often referred to as aerosol) of the virus does occur, particularly in enclosed spaces with poor air circulation (WHO, 2021d). Qian et al. (2020) studied case reports in 320 cities (including Hubei province) in China between January 4 and February 11, 2020, and identified 318 outbreaks with 1,245 confirmed cases. Outbreaks were highest in homes (79.9%), followed by public transport (34%). The authors concluded that sharing indoor spaces had the highest risk of SARS-CoV-2 transmissibility. These results demonstrate that open-air restaurants and other businesses (such as outdoor farmers markets, open air gyms) could be less high risk for SARS-CoV-2 transmission than indoor spaces (Qian et al., 2020).

The Centers for Disease Control and Prevention (CDC) investigated an outbreak in Guangzhou, China, where multiple families experienced COVID-19 symptoms after visiting a restaurant (Qian et al., 2020). The restaurant had 83 customers who became ill with COVID-19 between January 26 and February 10, 2020. The distance between each table was approximately 1 m (3 ft) and smear samples from the restaurant air conditioner were negative for SARS-CoV-2. The investigators concluded that the outbreak was due to droplet transmission. The researchers recommended increasing distance between tables and improving ventilation in restaurants to prevent the spread of SARS-CoV-2 (Qian et al., 2020). These studies demonstrated the importance of effective HVAC systems and reducing the number of diners in the dining room to maintain a 6-ft distance between tables.

Fomite Transmissibility

It is estimated that most humans spend >90% of their daily lives indoors (Dietz et al., 2020). Hence, it is important to review potential risks of SARS-CoV-2 transmission from fomites, especially because previous studies have shown that the human CoV virus (a strain similar to SARS-CoV-2) can survive on various hospital surfaces for several hours (Sizun et al., 2000). In addition, occupant density in closed spaces can also cause accrual of microorganisms on fomites over time (Horve et al., 2020). Studies have shown that patients with COVID-19 can shed viral particles before, during, and after experiencing symptoms—and even when asymptomatic (Rothe et al., 2020). The viral particles can settle onto fomites and serve as a reservoir for further viral transmission (Ong et al., 2020).

While the primary mode of SARS-CoV-2 transmission is respiratory droplets, there is a possibility, albeit low risk, of virus transmission via surfaces. A study performed in a hospital setting demonstrated the presence of SARS-CoV-2 RNA by testing items such as medical and exercise equipment, tablets, phones, and glasses (Santarpia et al., 2020). Studies have shown that SARS-CoV-2 can survive on surfaces such as plastic (3 days), glass (2 days), and aluminum (4 hr) and thus fomites could play a potential role in person-to-person transmission (Pastorino et al., 2020).

Previous studies have documented the effects of microbes' survivability and transfer from fomites (Stephens et al., 2019); research has been performed in food service settings that demonstrate the persistence of foodborne pathogens for up to 30 days on food service fomites such as laminated and paper menus (Sirsat et al., 2013). High-frequency touch areas (hot spots) in restaurant dining areas include menus, door handles/knobs, chairs, tables, and items that are placed on the table (e.g., ketchup and mustard bottles, salt and pepper shakers). Mouchtouri et al (2020) collected environmental swab samples from a ferry boat during a COVID-19 outbreak, a nursing home, a long-term care facility (where asymptomatic cases of the disease were identified), and three COVID-19 isolation hospital wards. The samples were tested using real-time reverse transcriptase polymerase chain reaction (real-time RT-PCR) and the results showed that SARS-CoV-2 was detected on swab samples taken from food preparation services and service areas within these locations. Hence, there is an increasing need for training and practice related to robust cleaning and sanitizing to reduce the risks, albeit low, associated with fomite contamination within food service operations.

A Renewed Focus on Personal Hygiene

A focus on effective cleaning and sanitation of fomites, effective social distancing practices, and mask wearing is required to reduce SARS-CoV-2 transmission risks for customers and employees. CDC has identified five risk factors that contribute to foodborne illness in food service and retail operations based on epidemiological outbreak data: 1) improper holding temperature, 2) inadequate cooking time, 3) contaminated equipment, 4) food from an unsafe source, and 5) poor personal hygiene such as inadequate hand washing and coming to work sick (U.S. Department of Health and Human Services, 2017).

CDC has reported multiple norovirus outbreaks associated with restaurants where the cause of the outbreak was a food service employee coming to work in spite of having gastrointestinal symptoms (CDC, 2020); almost 58% of all foodborne illness are caused by norovirus and most of these outbreaks occur in a restaurant setting (CDC, 2018). These findings are especially challenging in an industry that mainly pays food service employees hourly wages, provides limited or no health insurance, and gives limited or no paid sick time (Gangopadhyaya et al., 2018). This scenario is exacerbated during a pandemic such as COVID-19 (Gangopadhyaya & Waxman, 2020). Food service managers can demonstrate the importance of staying home during an illness when employees receive benefits such as paid time off and health insurance. Policy changes and resources need to drive forward a cultural change that has a focus on employee welfare, rigorous hand washing, and safe food handling practices.

Effective Leadership

Leadership with high emotional intelligence—defined as the capacity to be aware of, control, and express one's emotions, as well as handle interpersonal relationships judiciously and empathetically—is essential to pandemic preparedness and resilience building. As we prepared for the next wave of COVID-19, the worldwide insurgence of new and more infectious SARS-CoV-2 variants (Ali, 2020; Osterholm et al., 2021), and future pandemics in the next few decades, the focus on safe food practices through the flow of foods (from receiving to service) is essential to good working conditions, a positive work culture, employee well-being, and public health (de Freitas & Stedefeldt, 2020). Food service employees who work during a pandemic often do so for financial reasons, even at the risk of placing themselves and their loved ones at risk of infection. Individuals (e.g., chefs, managers, operation owners) who lead with empathy and use science-based resources to train their employees contribute to food safety effectively, and by listening to their employee opinions and suggestions, will be key to building resilience in the work culture (de Freitas & Stedefeldt, 2020).

Guidelines and Oversight

As witnessed during the COVID-19 pandemic, each state within the U.S. was uniquely affected by COVID-19 based on state size, population density, and governance (e.g., requirement to socially distance, wear masks, speed of action, etc.). A pandemic response plan for a variety of scenarios, including different types of biological hazards, can be prepared preemptively so the rollout is quick and effective. Response time is of the essence during a pandemic. A study demonstrated that 36,000 SARS-CoV-2 deaths could have been avoided if social distancing measures were implemented 1 week earlier in the U.S. (Pei et al., 2020). Another study showed that if 80% of the population wore masks, COVID-19 infections would plummet, the curve would flatten, and hospitals would not be overwhelmed. If only 50% wore masks, then this measure would not be sufficient to flatten the COVID-19 curve (Kai et al., 2020). These measures, when done early and effectively, can reduce the incidence of illness when states start to reopen and decrease the likelihood of restaurants and other businesses closing due to employees and/or customers testing positive for the virus.

At the federal level, FDA released a best practices document in 2020 that provided a checklist for restaurant and retail establishments for reopening (FDA, 2020); however, there is no consistent agency across states that performs outreach and oversight for the establishments (National Environmental Health Association [NEHA], 2020). The Texas Restaurant Promise, a collaboration of the Texas Restaurant Association, restaurants of all sizes, and public health officials from the U.S., developed guidelines for safer reopening of restaurants during the COVID-19 pandemic (Texas Restaurant Association, 2021). While the Texas Restaurant Promise aligns with the minimum standard health protocols from Texas, it is not legally enforceable. As a result, local public health officials lack the authority to enforce guidelines and provide oversight on strategies such as social distancing and mask wearing to decrease the spread of SARS-CoV-2. In prepandemic circumstances, cities and counties within the same state might have had different requirements and regulations (even neighboring locations within the same state). As food service operations began to reopen during the pandemic, the oversight on best practices related to COVID-19 (e.g., social distancing and mask wearing) varied across the U.S.

For example, food service employees in some counties in California are required to wear face masks, whereas employees in some counties are not (NEHA, 2020). Overall, these inconsistencies are a source of confusion and frustration among food service operators and public health officials (NEHA, 2020). Even though the Texas Restaurant Promise checklist is beneficial, particularly for food service operations reopening after a pandemic-related shutdown, there needs to be oversight and accountability similar to food safety inspections at the local level to ensure that workers and customers are safe and public health is protected. In addition, strong customer outreach needs to be incorporated to communicate the science-based strategies that restaurants are following.

Conclusion

According to FDA, food and food contact surfaces are not a source of transmission for SARS-CoV-2 (FDA, 2021); however, WHO released a document on March 30, 2021, stating that SARS-CoV-2 has been found to persist in cold chain and frozen food products in China and on products and packages from other countries that supply food to China (WHO, 2021a). Additional research and surveillance data are needed to determine the efficacy and transmissibility of SARS-CoV-2 in these environments.

Three SARS-CoV-2 variants were identified in the U.S. in January 2021 and the B1.1.7 variant (also known as the UK variant) was demonstrated to be highly transmissible and infectious (Osterholm et al., 2021). It is important to continue to follow common sense and science-based public health measure such as mask wearing and social distancing as global vaccination efforts ramp up. A commonsense and science-based strategy is particularly important during a pandemic to 1) save human lives and reduce the burden on hospitals and healthcare professionals, 2) effectively jump-start the economy and prevent the need for another shutdown, and 3) keep food service and other businesses open and thriving.

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Well Water Radium Study: The Story of Howard County, Maryland

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Abstract **In early 2005, the Howard County Health Department began a sampling initiative to evaluate the potential presence of elevated naturally occurring radionuclides in individual drinking well water supplies of Howard County residents. Earlier preliminary test findings from the U.S. Geological Survey and subsequent discussions with the Maryland Department of the Environment led to sampling for gross alpha (GA) and gross beta (GB) particles, plus confirming radium-226/-228 for both existing and newly developed residential properties. In 2009, sampling focused in and directly around the portion of the county containing the Baltimore Gneiss geological formation. More than 2,061 properties were tested with 3,091 samples collected and analyzed. Greater than 19% of properties sampled had elevated GA and/or GB levels, while select data combinations for untreated GA, GB, and radium-226/-228 indicated an elevated combined radium-226/-228 in 42.4% of those results. Also revealing were results with elevated radium-226/-228 with GB levels well below the current recommended standard. In this special report, we describe ongoing testing efforts and treatment effectiveness for residents within Howard County.**

Introduction

Radium was discovered by Marie and Pierre Curie in 1898. Soon after its discovery, the applications of the element began to grow. Radon gas, a byproduct of radium, was found to be successful at treating several types of cancer. Subsequently, radium was thought of as a magic cure-all and featured as an ingredient in many tonics and elixirs classified as "patent medicine" or "quack medicine" that had great health claims but little science to back the statements. Today we know exposure to radium can lead to anemia, cataracts, fractured teeth, and cancer (Agency for Toxic Substances and Disease Registry [ATSDR], 1990).

Radium is a naturally occurring radionuclide and low levels exist in the environment in rocks, soil, and groundwater. Radium has over 40 naturally occurring isotopes, or forms of the element that differ in their atomic mass and associated properties of radioactivity. Radioactive elements have an unstable nucleus that is constantly undergoing decay and their stability is known as a half-life (i.e., the time it takes for the radioactivity of an element to decay to one half its original value). The decaying element is the parent radionuclide and the resulting elements are known as the decay series. Most isotopes of radium have a half-life in the range of seconds to minutes, with radium-226 and radium-228 being the most stable isotopes. Radium-226, with a half-life of 1,600 years, is part of the uranium decay series and decays by emitting alpha particles. Radium-228 has a half-life of 5.75 years and is part of the thorium decay series, decaying by emitting beta particles. Radium in the environment can degrade only by decay and does not participate in any chemical reactions that convert it into other forms (ATSDR, 1990).

A known risk of exposure to radium is by consuming contaminated well water. Approximately 14% of the U.S. population relies on a private well for their primary source of drinking water (Dieter et al., 2018; Maupin et al., 2014). Though no specific regulations exist for radionuclides in drinking water from private wells, the U.S. Environmental Protection Agency (U.S. EPA) has set limits for radiation from gross (i.e., total) alpha and beta particle activity in public drinking water systems under the Radionuclides Rule (Table 1; U.S. EPA, 2016). In turn, these standards have been adopted by state and local governments to regulate the potability of well water.

The maximum contaminant level (MCL) for gross alpha particle activity is 15 pCi/L. Alpha particles, or the nuclei of the element helium, are the weakest form of radiation and can be stopped with a sheet of paper. The targeted MCL for beta particle activity is 50 pCi/L, roughly equivalent to the annual dose rate of 4 mrem/year. Beta particles, or electrons, require a material such as plastic or wood to block their ionization power. The MCL for combined radium-226 and radium-228 (radium-226/-228) is 5 pCi/L.

Radium and other radionuclides that are ingested are absorbed into the blood (Inter-

TABLE **1**

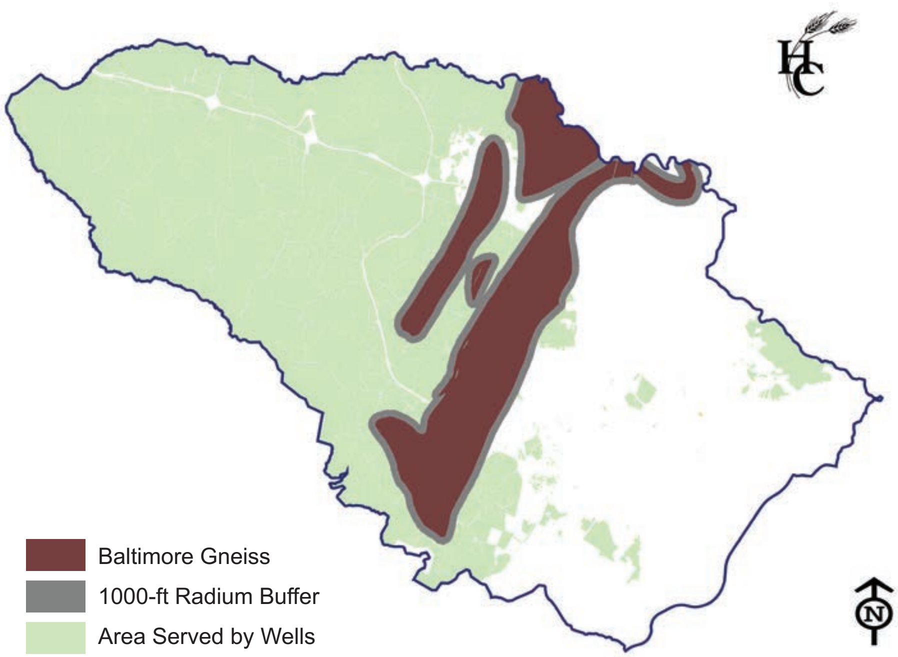
U.S. Environmental Protection Agency (U.S. EPA) Maximum Contaminant Levels (MCLs)

Parameter Name	MCL	Unit
Gross alpha	15	pCi/L
Gross beta	50*	pCi/L
Radium (combined radium-226/-228)	5	pCi/L
Uranium	30	µg/L

*Targeted value; MCL for beta particles is 4 mrem/year.
Source: U.S. EPA, 2001.

FIGURE **1**

Radionuclide Risk Areas, Howard County, Maryland



national Commission on Radiological Protection, 2007). The metabolism of radium in the body is similar to that of calcium, and radium has been found to concentrate in bones (Wrenn et al., 1986). Ingested radium is known to cause tumors in the lungs, bones, head, and nasal passages (Mays et al., 1985).

U.S. EPA has estimated that the additional lifetime risk of cancer associated with drinking water that emits alpha particle radiation at 15 pCi/L of water or has a combined concentration of radium-226/-228 of 5 pCi/L of water is about 1 in 10,000, assuming the average adult consumes 2 L of water/day for 70 years (Eckerman, 1999). Radium-228 is estimated to inducing bone sarcomas at a rate 2.5 times higher (per µCi) than radium-226 (Rowland et al., 1978).

Initial guidance from the Maryland Department of the Environment (MDE) and U.S. Geological Survey (USGS) between 2003 and 2004 alerted the Howard County Health Department (HCHD) to the potential presence of radium in areas of groundwater within the county. Howard County is located in the Piedmont region of Maryland and Baltimore Gneiss is a prominent geological formation throughout the central part of the state. According to MDE and USGS, this vein of Baltimore Gneiss running through central Howard County and the private wells drilled in this geological formation could be at increased risk for high levels of radium (Figure 1).

Based on this guidance, HCHD initiated a sampling survey to determine the potential impact of naturally occurring radionuclides on water quality for property owners served by well water. The survey started in early 2005 and is still ongoing. Sampling has been targeted to the Baltimore Gneiss region and a 1000-ft surrounding buffer area (Figure 1). The following report details the ongoing sampling efforts of HCHD, some challenges to incorporating both treated and untreated samples, and some surprising findings, primarily with respect to gross beta and corresponding radium-226/-228 levels.

Methods

As preliminary screening tools, short-term gross alpha (GA) and gross beta (GB) sampling typically is employed to determine the need for any additional and more involved testing. Quart-sized plastic Cubitainers (Hedwin Division #CUB0745) are used for the initial GA and GB sampling. For new construction of houses with wells within the Baltimore Gneiss and 1000-ft surrounding buffer area, collectively defined as the "radium area," sampling is done at the time of the well yield test.

For initial testing of soon-to-be-occupied new homes or existing residential structures served by well water, most samples are collected from the water pressure tank. If no water treatment is present, samples are collected where convenient. Samples are fixed with approximately 2–3 ml of nitric acid (HNO_3, CAS No. 7697-37-2; 37% W/V) to lower the pH to <2.0. Generally, short-term samples are sent directly to the Maryland Department of Health Laboratories Administration for analysis. Short-term samples are analyzed within 72 hr of collection (U.S. EPA method 900.0) to meet holding time requirements. Based upon these preliminary findings, additional (more detailed) testing may be recommended, which can occur when either GA and GB values exceed their respective U.S. EPA standard (Table 1).

Depending upon whether treatment such as a softener system or reverse osmosis (RO) is present, pretreatment and posttreatment sampling involving short- and long-term GA and GB, plus radium-226/-228, will be considered. Less frequently, uranium testing (U.S. EPA method 908.0) has also been conducted. Long-term GA and GB, radium-226/-228, and uranium samples are sent via FedEx ground shipping to Florida Radiochemistry Services, Inc. for analyses. Radium-226/-228 samples are collected in gallon-sized Cubitainers and fixed with HNO_3 (9–10 ml) to a pH <2.0. Holding times for these samples generally range from 10 days–3 weeks of collection (U.S. EPA method 903.1 for radium-226; U.S. EPA method Ra-05 for radium-228). The number, type of sample(s), and sample location(s) are based upon individual circumstances and prior results.

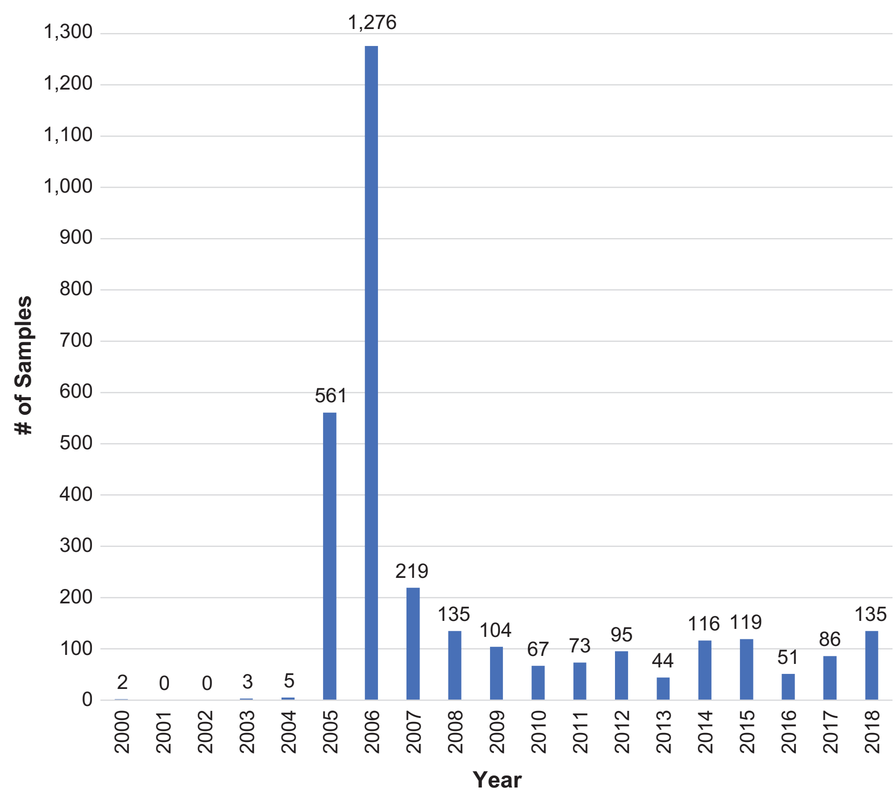
Results

Early sampling by HCHD first looked at short-term GA and GB levels in water from wells located in and around the Baltimore Gneiss region. Further testing to look at long-term GA, long-term GB, and combined radium-226/-228 levels was also suggested if the initial GA or GB levels exceeded their respective U.S. EPA standard. More than one half of Howard County by area is served by well water, with over 16,700 wells in existence at the end of 2018 (Figure 1). As of the end of 2018 (the basis for this data analysis), HCHD had tested wells from over 2,061 properties, totaling 3,091 samples throughout Howard County (Figure 2).

In the early days of this initiative, HCHD distributed a notification to homeowners in the area summarizing the potential link of elevated radium in well water and cancer, along with a recommendation for well water testing. The possible association with cancer triggered a greater-than-anticipated response from the public in 2005 and 2006, with 60% of the total samples collected within these two years. To date, this period remains the most active part of the study for the numbers of properties sampled. By 2009, the focus shifted to the new construction of wells in the Baltimore Gneiss region, where testing and corrective action may occur prior to use of the water in a household. Testing also continues to be provided free of charge to owners of existing wells located in the Baltimore Gneiss region.

FIGURE **2**

Treated and Untreated Samples for Gross Alpha, Gross Beta, and Radium From 2000–2018



The number of untreated samples collected per year and the percentage of GA and GB samples that exceed their respective U.S. EPA standards reveal a good amount of variability in numbers from year to year (Table 2). This finding could be due to new construction in specific areas of the Baltimore Gneiss region with higher or lower naturally occurring GA and GB activity. Our results indicate an average of 19.70% of GA samples and 1.54% of GB samples exceed their respective MCL or targeted standard. The large difference in percent exceedances between GA and GB potentially could lead to debate on whether to pursue further testing in the case of a high reading for a single contaminant. In general, if either GA or GB exceeds their respective U.S. EPA standard, HCHD pursues further testing.

One way to correlate GA, GB, and radium levels is to look at untreated radium-226/-228 samples from wells throughout the county. A subset of the total data revealed 48 properties that have untreated short-term GA and GB samples as well as untreated radium-226/-228. This combination of testing enabled us to determine the relationship between GA, GB, and radium values. A key but unexpected finding was that many of the samples with GA or GB below their respective U.S. EPA limits also had combined radium-226/-228 values greater than the maximum of 5 pCi/L (Figure 3). In particular, GB values much less than 50 pCi/L were correlated with elevated combined radium-226/-228 levels and more specifically, elevated radium-228 levels. This finding supports the HCHD approach of requiring further testing if either GA or GB exceeded their respective U.S. EPA limits.

An exceedance of the 5 pCi/L combined radium standard was noted in 41 sample results

TABLE **2**

Untreated Samples and Gross Alpha and Beta Exceedances From 2000–2018

Year	# of Untreated Samples	Gross Alpha Exceedance # (%)	Gross Beta Exceedance # (%)
2000	0	0 (0)	0 (0)
2001	0	0 (0)	0 (0)
2002	0	0 (0)	0 (0)
2003	2	1 (50.0)	0 (0)
2004	1	0 (0)	0 (0)
2005	443	76 (17.2)	6 (1.4)
2006	895	164 (18.3)	14 (1.6)
2007	162	22 (13.6)	2 (1.2)
2008	72	20 (27.8)	0 (0)
2009	28	8 (28.6)	1 (3.6)
2010	36	12 (13.3)	1 (2.8)
2011	40	13 (32.5)	1 (2.5)
2012	56	19 (33.9)	5 (8.9)
2013	17	6 (35.3)	0 (0)
2014	65	17 (26.2)	1 (1.5)
2015	87	14 (16.1)	0 (0)
2016	21	1 (4.8)	0 (0)
2017	63	9 (14.3)	0 (0)
2018	93	28 (30.1)	1 (1.1)
Total	2,081	410 (19.7)	32 (1.5)

following treatment (representing 17.7% of all treated samples) plus 28 sample results (short-term and long-term) prior to treatment (representing 42.4% of all untreated samples) (Table 3). In light of these results, it became apparent early on that treatment designed to effectively mitigate elevated contaminant levels would be needed for a number of wells (Table 3). Table 4 summarizes the general advantages and limitations associated with the treatment mitigation options recommended by U.S. EPA.

Figure 4 depicts the observed individual effectiveness of water softeners and RO treatment, plus both systems in combination. Individual and combined treatment was more effective in addressing GA contaminants (including an upper limit of nearly 100% for all 3 categories) than GB contaminants, which showed more variability individually and collectively. Combining a water softener and RO is highly effective for GA contaminant reduction, while only slightly more effective overall in reducing GB contaminants. A few instances (those below 0%) were observed where posttreatment values were higher than pretreatment. In those instances, we surmised that the treatment units needed maintenance.

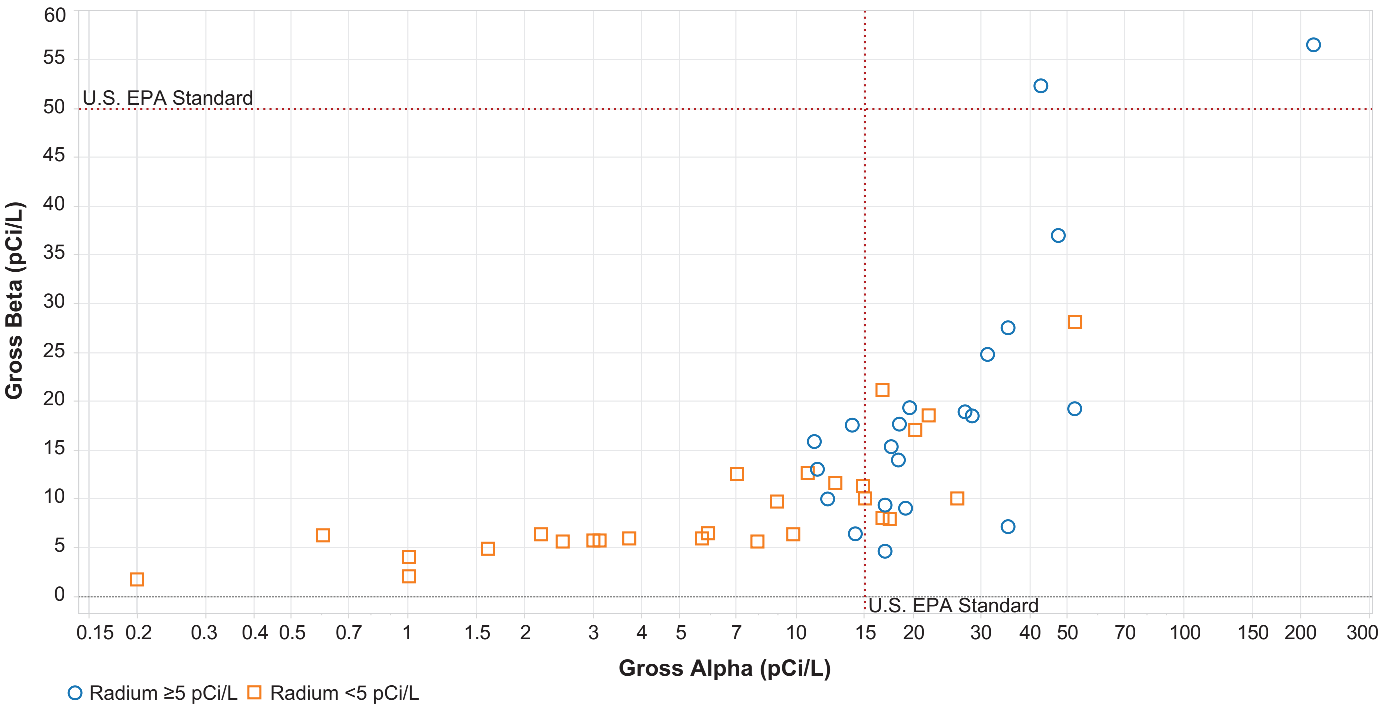
Discussion

Baltimore Gneiss has a mineral composition of 95% biotite-quartz-feldspar gneiss, with occasional minor muscovite or garnet. The formation represents some of the older geology in the area, dating back to the Precambrian Era, and has a varied texture and structure. It's important to note that the Piedmont geology in this area equates to unconfined aquifers, meaning that individual well water supplies vary for each well. Consequently, accurate information for these naturally occurring radionuclides can be obtained only through sampling as many wells in the targeted area as possible. While testing over time has identified some hot spots of elevated activity, results from an individual well might not be consistent with neighboring wells. Currently, there is no observable correlation of elevated test results in the affected wells with well depth, yield, or age. Similarly, some wells sampled on the edge or just outside of the Baltimore Gneiss area (Figure 1) have shown elevated levels of one or more of these radionuclides when none would be anticipated.

Looking at untreated or pretreatment samples can give an indication of the naturally occurring levels of gross alpha and beta activity in tested well water supplies. As the overall goal of this testing program is to ensure that residents have access to well water that meets U.S. EPA standards for GA, GB, and radium, it is also important to look at treatment efficiencies by analyzing posttreatment values. If an initial sample shows GA or GB levels above the U.S. EPA standards listed in Table 1, a homeowner is advised to pursue further long-term

FIGURE **3**

Relationship of Gross Alpha, Gross Beta, Radium-226/-228, and Respective U.S. Environmental Protection Agency (U.S. EPA) Standards



GA and GB testing, plus radium-226/-228 sampling. The homeowner, moreover, is advised to install for the house a drinking water treatment or fix the existing ineffective treatment if the additional testing shows any sample results exceeding applicable U.S. EPA standards. At a minimum, treatment must reduce the levels of GA, GB, and radium-226/-228 in the residential drinking water supply.

Two types of commonly used water treatments that are effective at reducing levels of GA, GB, and radium-226/-228 include water softener and RO systems (Table 4). Water softener systems typically are installed at the point-of-entry of the water supply to the house, while RO systems can either be point-of-entry (whole house) or point-of-use; the latter treats only the drinking water supply for the house. Once installed, the treatment then is required to be maintained by the homeowner for the given well.

Water softeners and RO systems have both advantages and disadvantages. In summary, a water softener system is a lower overall cost treatment and easier to maintain than

TABLE **3**

Gross Alpha, Gross Beta, and Radium Comparisons in Treated Versus Untreated Samples (*N* = 3,074)

Analyte Tested	Treated Samples # (%)	Untreated Samples # (%)
Gross alpha		
<15 pCi/L	659 (82.5)	1,775 (80.5)
≥15 pCi/L	140 (17.5)	429 (19.5)
Total	799	2,204
Gross beta		
<50 pCi/L	767 (96.8)	2,171 (98.5)
≥50 pCi/L	25 (3.2)	33 (1.5)
Total	792	2,204
Radium		
<5 pCi/L	191 (82.3)	38 (57.6)
≥5 pCi/L	41 (17.7)	28 (42.4)
Total	232	66

Note. Samples include initial and various follow-up collection combinations.

TABLE **4**

Mitigation Options

	Water Softener	Reverse Osmosis	Reverse Osmosis (Whole House)
Type of system	Point-of-entry	Point-of-use	Point-of-entry
Operating specification	Ion exchange	Filtration/purification	Filtration/purification
Drawback	Increased sodium or potassium levels in treated water	High salt concentration of wastewater	High salt concentration of wastewater
Wastewater disposal	Pretreatment of wastewater might be needed for disposal in resident's septic system	Large volume of additional wastewater for resident's septic system	Large volume of wastewater might require a separate septic disposal area
Cost	Lower	Moderate	Higher
Maintenance	Occasional, by homeowner	Occasional, by homeowner	Frequent, by water treatment specialist

Source: U.S. Environmental Protection Agency, 2004, 2007, 2016; Variances and Exemptions, 2000.

an RO system. Water softener systems also elevate the level of sodium or potassium in the treated water depending on the substrate used. In the few instances where posttreatment values were observed to be higher than pretreatment values (Figure 4), the substrate (sodium- or potassium-based) was changed and follow-up testing was done. Point-of-entry RO systems generate a significant volume of wastewater that can necessitate a separate sewage disposal area if the homeowner has a septic system.

Once a new treatment is installed, or after an existing treatment is serviced, follow-up testing is performed to evaluate the effectiveness of the treatment devices. The effectiveness of the treatment depends on when a system was initially installed and the extent to which it was maintained by the homeowner; therefore, variability in the reduction of levels of GA, GB, and radium-226/-228 is not surprising. Well water that has been treated with a combined treatment generally shows a greater reduction of GA, GB, and/or radium-226/-228, though the water might have had higher raw levels to treat.

As installing a treatment and submitting posttreatment samples can require fewer steps to ensure potable water (when compared with retesting and submitting additional pretreatment short-term and long-term samples), builders and homeowners often choose this option. As a result, HCHD has a smaller set of results, totaling 48 (Figure 3), for wells combining pretreatment GA and GB samples with untreated radium-226/-228 compared with the 2,061 properties that have had GA and GB sampling completed by the end of 2018.

Conclusion

In the early 2000s, a limited sampling survey to determine the potential impact of some naturally occurring radionuclides on residential properties served by well water expanded and evolved into a broader testing effort in 2005. Beginning in 2009, this survey was refined to eventually become the more targeted testing program that continues today. Through the end of 2018, HCHD had tested wells from >2,061 properties, totaling 3,091 samples throughout Howard County.

To date, results from both existing and newly constructed properties highlight a definite link of well water in the Baltimore Gneiss with elevated levels of several naturally occurring radionuclides. Elevated levels of GA were noted in 19.70% of GA samples and 1.54% of GB samples when compared with their respective MCL or targeted standard. HCHD has gained important information from looking at untreated radium-226/-228 values, mainly that GB values much below the U.S. EPA limit of 50 pCi/L frequently correlate with radium-226/-228 values >5 pCi/L. This finding should serve as a wake-up call for others performing these analyses and relying on this standard without appropriate follow-up testing evaluating radium levels.

With an overarching goal for this study of ensuring that drinking water supplies meet U.S. EPA regulatory standards, much of our efforts have focused on advising homeowners of appropriate treatment(s), plus confirmatory testing to establish efficacy of the existing or installed treatment. Based upon the initial findings in conjunction with treatment options employed, different sampling combinations have been used, resulting in a variety of data subsets.

With this program now a staple of operations, future testing will focus on hot spots and revisiting properties to see how values change over time.

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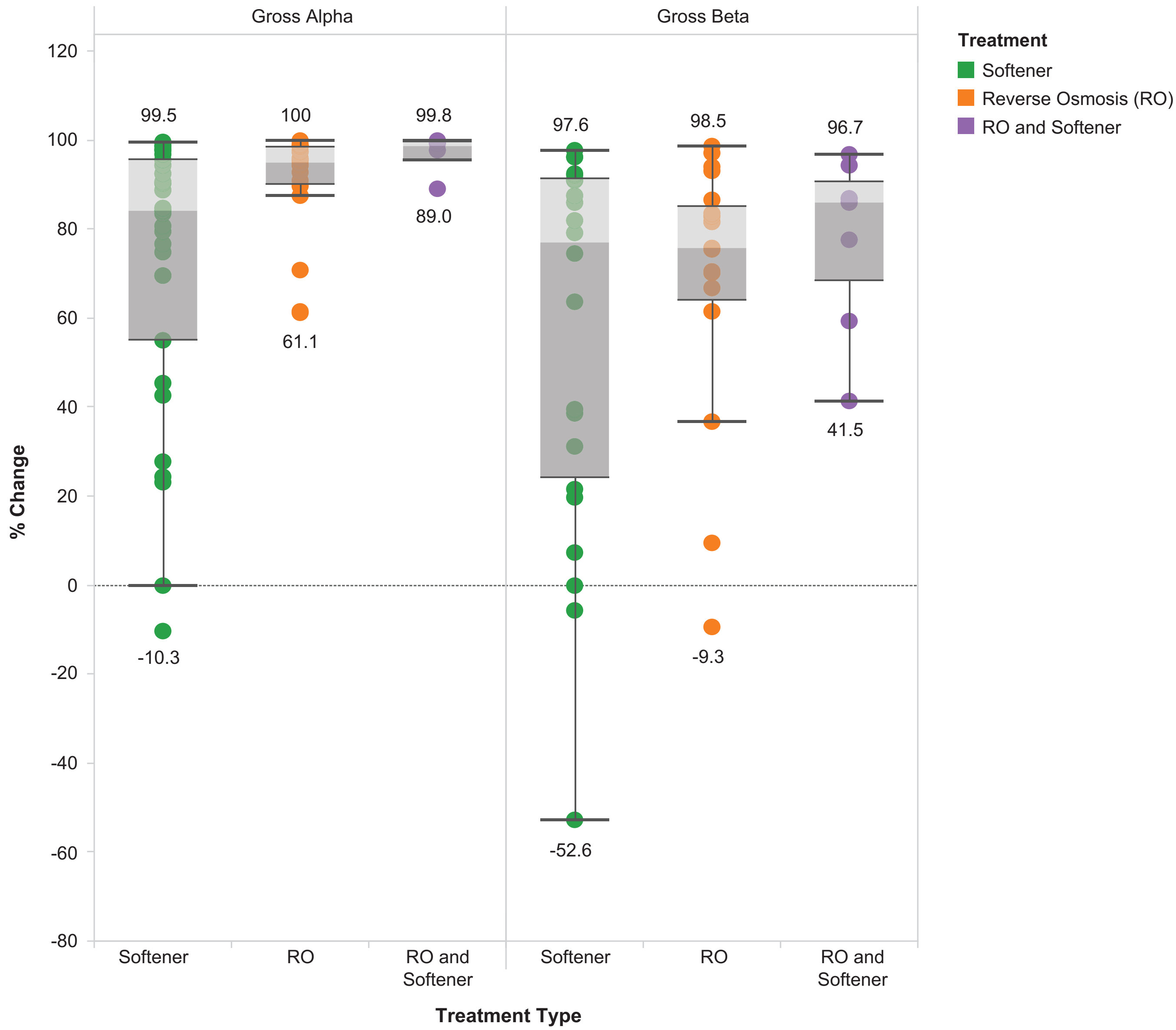
FIGURE **4**

Short-Term Treatment Effectiveness (*N* = 103)



Note. Two outliers of <-60% are not displayed.

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SPECIAL REPORT

Addressing the Opioid Crisis in Native American Communities: The Role of Environmental Health Specialists

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Abstract **In Arizona, opioid-related deaths have increased by 74% since 2012. In addition, the reported number of opioid-related deaths, inpatient incidences, and emergency department incidences increased 310% from 2008–2016 among the American Indian/Alaska Native (AI/AN) service population within the Phoenix Area Indian Health Service (PAIHS). Using the *Strategy to Combat Opioid Abuse, Misuse, and Overdose: A Framework Based on the Five Point Strategy* as a template (U.S. Department of Health and Human Services, 2017), the Division of Environmental Health Services (DEHS) within PAIHS was able to identify several community-based actions to assist in addressing this crisis in the AI/AN communities it serves. These actions included improving opioid-related poisonings data, identifying methods to safeguard medication in the home environment, advocating for community-based prescription medication disposal programs, facilitating medical-assisted treatment training for tribal healthcare professionals, and identifying resources for naloxone to be used by tribal first responders. DEHS staff members worked collaboratively with federal, state, and tribal partners on the design, development, implementation, and evaluation of community-based activities to ensure they are effective and culturally appropriate.**

Introduction

The opioid epidemic continues to be a public health burden in the U.S. An estimated 130 people die each day from an opioid-related drug overdose (U.S. Department of Health and Human Services [HHS], 2021). Over 2 million individuals in the U.S. have an opioid use disorder associated with prescription medication (Center for Behavioral Health Statistics and Quality, 2018). In Arizona, data collected suggest that opioid-related deaths have increased by 74% since 2012 (Arizona Department of Health Services, 2016). The American Indian/Alaskan Native (AI/AN) population in Arizona is not immune to this problem. The reported opioid-related deaths, inpatient incidences, and emergency department incidences increased 310% from 2008–2016 (Arizona Department of Health Services, 2018). To address this widespread problem, the U.S. Department of Health and Human Services (HHS) developed the *Strategy to Combat Opioid Abuse, Misuse, and Overdose: A Framework Based on the Five Point Strategy* (HHS, 2017; Figure 1).

The Role of Environmental Health Specialists in Opioid Poisoning Prevention

The authors of this special report are part of the Division of Environmental Health Services (DEHS) within the Phoenix Area Indian Health Service (PAIHS), which is one of the 11 operating divisions within HHS. PAIHS is one of 12 areas that are responsible for providing direct medical and public health services to members of >565 federally recognized AI/AN tribes in the Phoenix area. DEHS provides direct environmental health services and consultation to AI/AN governments and other IHS programs with a service population of >140,000 individuals across four states (Indian Health Service, 2018). Along with general environmental health services, DEHS also works to address injury disparity, including poisonings, in their service population.

Although IHS and tribal clinical staff are proactively addressing the opioid issue in the healthcare setting, it is important to identify what can be done at the community level to ensure a comprehensive approach. Through collaborative efforts from state partners and DEHS colleagues, the authors were able to identify methods and strategies to reduce the incidences of opioid-related poisonings within tribal communities in the Phoenix area. Table 1 highlights the role of environmental health specialists in the prevention of opioid-related poisonings following the HHS Five Point Strategy.

Conducting Data Surveillance to Better Understand the Magnitude of the Problem

Due to the varying levels of capacity to provide emergency care at IHS and tribal health-

FIGURE 1

U.S. Department of Health and Human Services Five Point Strategy to Combat the Opioid Crisis

care facilities, many injuries, including poisonings, that require a higher level of medical care cannot be addressed at these facilities. This deficit can result in patients receiving care from non-IHS or nontribal facilities, making it difficult to produce accurate epidemiological reports. To address this issue, DEHS staff members have worked to develop limited use data sharing agreements with state health departments in an attempt to collect data on those outside cases.

Improving Data Quality Through Better Postmortem Surveillance

Currently in Arizona, postmortem blood sampling is conducted when a fatality occurs from an injury. This practice allows for a more complete accounting of opioid-related fatality cases. Due to the cost of the sampling, lack of resources, and concerns about the invasiveness of the procedure, however, a blood sample is not always collected in tribal communities. This identified gap led DEHS staff to facilitate a partnership between the Arizona state laboratory and these communities. This new partnership seeks to increase the frequency of postmortem blood sampling at no cost to the tribes. Increased sampling could lead to better case identification that could also be used to refine intervention efforts.

Furthermore, a 2019 taskforce composed of federal, state, and local partners was established to identify proper coding for opioid-related events within Arizona. DEHS staff members, along with other IHS partners, were tasked with determining a standard for coding opioid-related events in Arizona using the International Classification of Diseases, 10th revision (ICD-10). This initiative included reviewing the opioid-related ICD-10 diagnosis codes, discussing how federal and state entities were coding opioid-related events, and then uniformly agreeing on how to consistently apply the code within Arizona.

Tribal communities in Arizona now have the option to improve data quality for opioid-related cases by providing postmortem blood samples to the state laboratory for analysis at no charge. One tribal community has started to initiate the process of training individuals to take samples and set up courier locations for their submissions. Outreach to tribal partners on this initiative is ongoing.

Identifying Methods to Safeguard Medication in the Home Environment

Another strategy to address prescription opioid misuse and diversion is ensuring medications in the home environment are securely stored. According to a published report, one recommended strategy is to provide clear guidance on safe storage of prescription drugs (Alexander et al., 2015). DEHS staff conducted a series of focus groups among tribal elders to gather input on the feasibility and acceptability of the use of medication lock boxes as a community-based prevention option to encourage safe storage practices for opioid prescription medications in the home environment. A moderator's guide was developed to provide a uniform approach for the facilitation of the focus groups. Four different lock boxes were demonstrated to the participants along with hands-on opportunities for the focus group participants to handle each box. DEHS staff facilitated the sessions and shared the findings with key community partners.

From October 2017–May 2018, 10 focus groups were held with a total of 101 elders from 7 Arizona tribal communities. The results strongly indicate that participants were supportive of a distribution program for medication lock boxes. Based on these findings, an in-home medication lock box pilot project has been developed and implemented in 8 tribal communities: 10 participants in each of the 8 communities volunteered to receive a lock box from DEHS and 55 lock boxes have since been installed. An evaluation on the use and effectiveness of each box will be conducted at 30 and 60 days following the initial installation.

Identifying and Advocating for Consumer Drug Disposal Programs

As of October 9, 2014, the Drug Enforcement Administration (DEA) can authorize health-care facilities to collect controlled substances from patients (Disposal of Controlled Substances, 2014). The installation of medication disposal drop boxes in community-based clinics can allow for the safe disposal of opioids and other prescription medications in a secure environment. Reducing the amount of unused or expired medication in the home environment can be instrumental in reducing prescription opioid diversion and incidental poisonings. DEHS staff members have been advocating for the use and availability of medication disposal boxes at hospitals, clinics, and law enforcement departments throughout tribal communities. Interviews are conducted with key staff at healthcare facilities to identify the current inventory of medication disposal boxes or to identify interest in having one at their location. DEHS will continue to partner with state and tribal programs in an attempt to facilitate the acquisition of medication disposal boxes for all Phoenix area tribal communities.

To date, 571 pounds of medication have been discarded in the three medication disposal boxes already installed in tribal healthcare facilities. DEHS staff members are also identifying evaluation methods to learn more about the knowledge, attitudes, and perceptions on the use of medication disposal boxes. Advocacy for the boxes throughout tribal communities is continuing.

To provide additional options for medication disposal, DEHS staff members help tribes obtain drug deactivation bags. These bags can be used by community-based health programs to dispose of unused or expired medications in the home setting. Drug deactivation bags contained carbon powder that neutralizes medications. Deactivation bags work by depositing medications into the bag, adding warm water, sealing, and shaking the bag to mix contents. After 30 s, contents are deactivated and safe for domestic trash (Verde Technologies, Inc., 2015). DEHS staff members have facilitated a process for tribes in Arizona to receive 1,700 deactivation bags. The bags have been distributed to community-based health programs in two tribal communities. To date, 2,611 pills, 777 ml of liquid medicine, and 8 medicated patches have been discarded through this process

TABLE **1**

The Role of Environmental Health Specialists in the Prevention of Opioid-Related Poisonings

U.S. Department of Health and Human Services Strategy*	Injury Prevention Program Roles
Better data	• Conduct data surveillance to better understand the magnitude of the problem • Improve data quality through increased postmortem surveillance
Better addiction, prevention, treatment, and recovery services	• Identify methods to safeguard medications in the home environment • Identify and advocate for consumer prescription medication disposal programs • Identify resources for medication-assisted treatment training
Better targeting of overdose-reversing drugs	• Connecting first responders with naloxone

*From *Strategy to Combat Opioid Abuse, Misuse, and Overdose: A Framework Based on the Five Point Strategy,* U.S. Department of Health and Human Services, 2017.

Connecting Tribes to Naloxone and Medication-Assisted Treatment Training

One strategy to reduce the effects of a prescription opioid overdose is through providing naloxone to first responders, especially those in rural areas where response times can be slower. Naloxone is a medication that can rapidly reverse the effects of an opioid overdose, and can be lifesaving if administered in time and correctly (Centers for Disease Control and Prevention, 2015). Naloxone can be administered by injection or via a nasal spray with a minimal amount of training.

Initially, the police departments of the Bureau of Indian Affairs were receiving naloxone through the IHS Pharmacy program via an existing federal memorandum of agreement. Tribal first responders (e.g., tribal police, fire, and emergency medical services), however, were not able to access naloxone through this memorandum. Conversely, state health departments had access to naloxone but were not able to reach tribal first responders. To address this gap, DEHS facilitated a process to ensure the first responders could receive naloxone nasal spray packs and training from their participating state health agencies at no cost.

Through the partnerships created with the state health agencies, first responders from 11 tribes in Arizona and Nevada have received 670 doses of naloxone. Training on reporting and the proper administration was also provided at no charge. DEHS staff members are working with the first responders to help evaluate the naloxone distribution activities by assisting them with the development of tracking and reporting tools.

Similarly, medication-assisted treatment (MAT), a combination of medication and behavioral therapy, is another strategy to address opioid use disorder (Substance Abuse and Mental Health Services Administration, 2021). Several of the Phoenix area tribal healthcare facilities were not able to access MAT training through IHS, though, because they manage their own health services and are no longer an IHS healthcare facility. DEHS staff facilitated an arrangement with the state resources and university partners to provide MAT training to healthcare professionals at these facilities.

MAT training has been provided to 60 healthcare professionals in healthcare facilities operated by tribes in Nevada. Since the original training session, two additional Nevada-based facilities have scheduled training for their healthcare professionals.

Summary

The identified community-based DEHS actions resulted in the recommended next steps. For example, DEHS staff members currently are in the process of identifying a sustainable supply of naloxone for tribal first responders through collaborative efforts with IHS and tribal pharmacies via memorandums of agreement. Another step identified includes evaluating the use and success of naloxone in tribal communities. Further recommendations include 1) developing an opioid-specific epidemiology report for the PAIHS service population, 2) evaluating the medication lock box pilot project based on the focus group findings, and 3) advocating for safe and appropriate medication disposal practices in the community.

The DEHS role in combating the opioid crisis continues to evolve. Program capacity can vary among IHS areas. The critical step for PAIHS was to gain an understanding of the HHS Five Point Strategy to combat the opioid crisis and compare it with what was in place to identify potential gap areas. This action led to a search for potential IHS programs or external partners that could fill those gaps. Partnering with other programs and organizations has been key to the preliminary successes, such as the use of medication lock boxes, safe disposal strategies, and connecting tribes with naloxone.

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Disclaimer: The opinions expressed in this special report are those of the authors and do not necessarily reflect the views of IHS. The authors declare no financial disclosures or conflicts of interest.

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BUILDING CAPACITY

Darryl Booth, MBA

Building Capacity Through LTE and 5G Wireless

Editor's Note: **A need exists within environmental health agencies to increase their capacity to perform in an environment of diminishing resources. With limited resources and increasing demands, we need to seek new approaches to the business of environmental health. Acutely aware of these challenges, the National Environmental Health Association (NEHA) has initiated a partnership with Accela called Building Capacity—a joint effort to educate, reinforce, and build upon successes within the profession using technology to improve efficiency and extend the impact of environmental health agencies.**

The *Journal* is pleased to publish this column from Accela that will provide readers with insight into the Building Capacity initiative, as well as be a conduit for fostering the capacity building of environmental health agencies across the country. The conclusions of this column are those of the author(s) and do not necessarily represent the views of NEHA.

Darryl Booth is the general manager of environmental health at Accela and has been monitoring regulatory and data tracking needs of agencies across the U.S. for 20 years. He serves as technical advisor to NEHA's data and technology section.

From my college days, I vividly recall certain moments of clarity. These moments occurred when the concept being discussed by the professor connected to my worldview. These snapshots of understanding were permanently detailed in my long-term memory. I imagine that I'm not alone in the experience of how impactful these "aha!" moments can be.

The business term **knowledge worker** describes workers whose main capital is knowledge, which includes people whose jobs involve handling or using information. Examples include pharmacists, scientists, accountants, and academics. My professor emphasized the fact that knowledge workers (think now about environmental health professionals) require unrestricted access to data and the tools to analyze them, thus leveraging those data against the knowledge worker's training and experience to add greater value.

Leap forward and the model still fits. In fact, it fits extraordinarily well to our environmental health (and other) colleagues working in the field to protect the public's health.

As I meet now with many environmental health leaders, the conversation around field inspection hardware and software often follows a script that I will attempt to reproduce here.

What environmental health professionals love about field inspection software:

- I can avoid or reduce file review.
- I can reference a library of standard comments.
- I can integrate modern tools such as digital photography, video, annotation, and more.
- I benefit from easy communication with my manager, supervisor, and others.
- I can capture digital signatures.
- I can produce a high-quality, readable inspection report for operators and consumers.
- I avoid double data entry.
- I feel gratified that my employer invests in my efforts by providing equipment, software, and access.

Where environmental health professionals can struggle with field inspection software:

- I worry about battery life, readability, added weight, and accessories.
- I worry about the potential for hardware to be stolen or damaged.
- There are conflicting perceptions around paper-based versus digital inspection reports.
- I worry that the performance of the system (e.g., speed, reliability, ease-of-use) might undermine my human interaction with the operator, especially during tense moments.
- I worry that I can't rely on wireless (e.g., LTE and 5G) in a variety of situations where I work, including rural areas, basements, and industrial buildings.

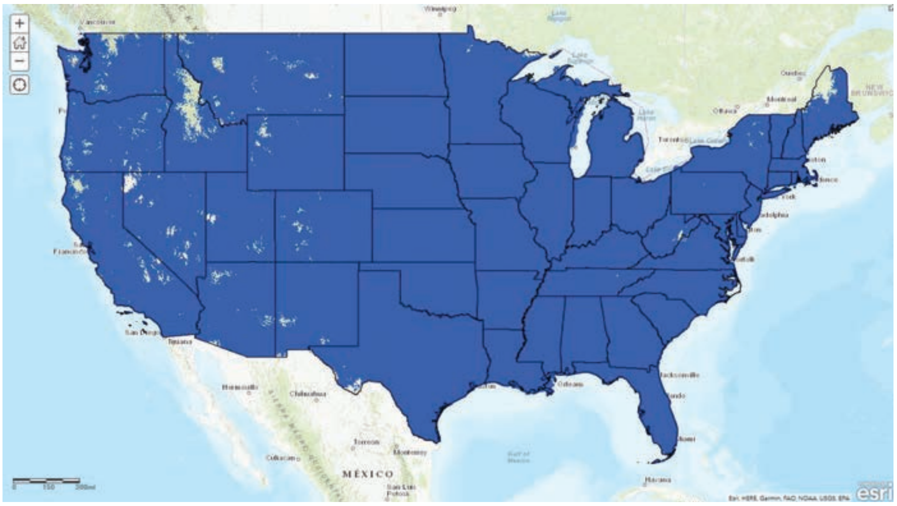
This column takes a deep dive and examines wireless reliability and its promise for the future.

Commercial Wireless Reliability

According to the *2020 Communications Marketplace Report* released in December 2020, nearly 100% of the U.S. population has access to at least one carrier providing

FIGURE **1**

Nationwide Mobile Wireless Coverage, Year-End 2019



Note. Blue shading indicates coverage.
Source: Federal Communications Commission, 2020.

coverage to (at least) the U.S. Census block centroid (Federal Communications Commission, 2020; Figure 1). That last little bit, the reference to the U.S. Census Block centroid, is important because the "population" with coverage is counted if the carrier's signal reaches at least the center-most point within that census block. It *does not* mean that every home or business in that census block has coverage. Just keeping things honest. We can, however, take away that U.S. wireless coverage is widespread and meets the definition of essential and reliable infrastructure. Wireless coverage is secure, inexpensive, and markedly prevalent in our personal and professional lives.

So, why then do we feel angst about relying on this network to do our field work? It is because we each carry a mental file folder of worst-case anecdotes such as the restaurant's basement, the industrial warehouse, or the onsite wastewater treatment project far away from the nearest tower.

For your consideration: Are the worst case scenarios serious enough and prevalent enough to step away from wireless?

Contemplating that question, I set out to study how other knowledge workers attack the same problem.

When the stakes are highest, the workers' equipment switches between networks. For example, if one network provider has no service, the device just switches to a different provider. Or, in a more economic option, the software preloads some data to enable offline work for a bit. Return to a covered area and our devices can "push" those inspections to the cloud or home office.

You will not be surprised to conclude that, as in many things, a balanced approach requires trade-offs. To have access to multiple services increases costs. To go offline for long periods increases latency and reduces inspector flexibility. The trade-offs will differ per program area, where public pools tend to exist in areas of great coverage and water wells do not.

I encourage knowledge workers to insist on data access and analysis tools, those things that—when combined with your education and experience—define you as knowledge workers. In that vein, I advocate for modern always-on connectivity where it is possible.

One can check regional coverage per carrier at sites like Signalchecker.com. There are also apps that, when running in the background over days or weeks, can give you personalized coverage maps built over time. Look for apps like Coverage and OpenSignal. Don't, however, get drawn into a rabbit hole. Most likely, one of the big three carriers is already well-known for good coverage in your area.

Let's understand that going offline is sometimes a reality. If we think about it objectively, it's not very often for the vast majority of us. This group can march forward. In less supported geographies, we simply prepare for offline by beginning/ending our day in an area of coverage and keeping those data offline until we return.

Looking ahead to 5G, there is the promise of high-speed wireless sufficient to instantly inform autonomous vehicles of oncoming traffic. A reality in our largest cities, 5G is (at least initially) not that compelling in most geographies.

5G comes in three different flavors. At its host basic (low band), 5G can be slower than LTE. In metropolitan and dense urban areas, high and ultra-high band rollouts bring blistering speeds. This technology will come along very quickly, pushed forward by its commercial applications, and we shall be there to take advantage when it does.

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Reference

Federal Communications Commission. (2020). *2020 communications marketplace report* (FCC 20-188). https://docs.fcc.gov/public/attachments/FCC-20-188A1.pdf

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- LinkedIn: www.linkedin.com/company/national-environmental-health-association

DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES


Raymond J. Lopez
Centers for Disease Control and Prevention


Aura Ortiz Sánchez, MHSA
Puerto Rico Department of Health

Rebuilding for Resiliency: How Puerto Rico's Environmental Health Department Managed Several Public Health Emergencies and Emerged Stronger

Editor's Note: The National Environmental Health Association (NEHA) strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, NEHA features this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC's Water, Food, and Environmental Health Services Branch, as well as guest authors, will share insights and information about environmental health programs, trends, issues, and resources. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

Raymond Lopez is an environmental health scientist for the Division of Environmental Health Science and Practice within CDC's National Center for Environmental Health. Aura Ortiz Sánchez is the program manager of environmental health within the Puerto Rico Department of Health and the Public Health Crisis Response—Cooperative Agreement Program.

The island of Puerto Rico endured several emergencies/disasters between 2017 and 2021 that threatened both its physical infrastructure and human resource capital. From a devastating hurricane to a worldwide pandemic, the Puerto Rico Department of Health (PRDOH) Environmental Health Program faced each challenge with the mission-minded resolve that is key for rising above seemingly insurmountable setbacks. When Hurricane Maria made landfall in September 2017, the catastrophic Category 5 storm brought a large storm surge, heavy rains, and wind gusts well above 100 mph, leaving devastating damage to roads, homes, powerlines, food service establishments, drinking water and wastewater systems, and healthcare facilities. As a result, most of the island's population lost access to basic resources and services such as electrical power, clean water, wastewater systems, and healthcare.

The Centers for Disease Control and Prevention (CDC) supported three projects from 2018–2021 to assist PRDOH's hurricane recovery efforts, specifically to help strengthen its ability to respond to these hazards and to revitalize environmental health services, workforce, and IT infrastructure:

1. Build the environmental health workforce and improve environmental health protocols and processes (e.g., update equipment; hire staff; provide training for food/milk, water, and radiology divisions; and update regulations).
2. Develop environmental health IT infrastructure, collect and use data, standardize assessment procedures with electronic applications, and use REDCap (www.project-redcap.org) as an electronic assessment tool.
3. Design a long-term workforce development program for the department (e.g., develop and deliver classroom and field-based training on scientific, technical, and procedural aspects of environmental health).

Project activities involving facility inspections, equipment procurement, and IT infrastructure made rapid progress in 2018 but slowed in the subsequent years when Puerto Rico experienced seismic activity and COVID-19. In late December 2019, a series of daily earthquakes struck the island and the Puerto Rico Seismic Network registered 43 significant aftershock quakes. Again, the island's population was left with unstable and unsafe working and living conditions, power outages, water contamination, emotional distress, and property loss (Photo 1). Many people were fearful of returning to their homes; temporary shelters were overrun with thousands of people seeking refuge (Photo 2). The large influx of people into shelters resulted in major logistical challenges, including caring for older adults, immunocompromised individuals, children,

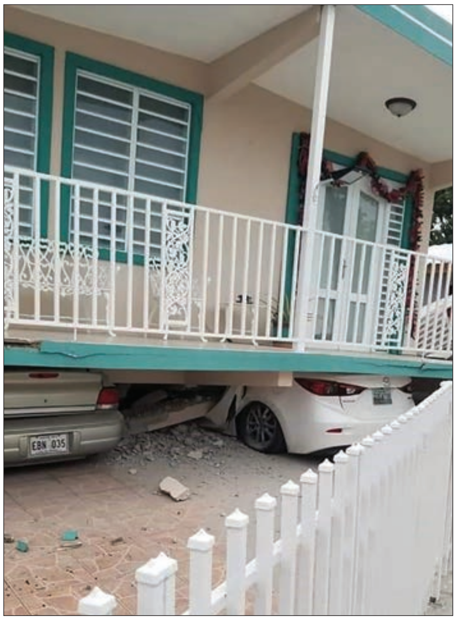

Photo 1. *The series of daily earthquakes that struck Puerto Rico in late 2019 left buildings unstable and residents fearful for their safety. Photo courtesy of the Puerto Rico Department of Health.*

Photo 2. *After the earthquake, thousands of refugees sought shelter, which increased the risk for foodborne illness and hygiene-related illness. Photos courtesy of the Puerto Rico Department of Health.*

and other at-risk populations. Immediately, project staff and resources shifted from hurricane recovery to emergency response, specifically inspecting shelters, mobile medical units, food service facilities, and water supply trucks. The department also addressed issues involving stray animals, pests, food safety, water sanitation, and sewage. In total, the department developed 38 different educational resources for digital and print distribution to provide guidance and help improve food safety and water sanitation for the local population (Figure 1).

When COVID-19 cases increased in March 2020, the project-related work drastically slowed again as the pandemic required full staff attention. Furthermore, since staff were directed to work from home, conducting in-person inspections of facilities was nearly impossible. Once again, PRDOH redirected resources to develop COVID-19 procedures and protocols for inspectors and guidance for the community on hand-washing techniques, sanitary preparedness, and requirements for obtaining a sanitary license for food establishments.

After 3 years of tremendous personal and professional stress on PRDOH staff, department leaders realized staff needed help managing their stress and emotions as first responders during the crises they had just endured. In response, PRDOH coordinated with Americares and the Federal Emergency Management Agency (FEMA) to deliver two resilience-building sessions—a one half-day workshop and a one half-day conference—to all environmental health personnel, including inspectors, regional directors, administrative personnel, division directors, and project contractors. During these activities, staff expressed their work-related stress and discussed strategies for self-care and how to prepare themselves to take care of others.

Puerto Rico's multiple public health emergencies posed challenges to the development and delivery of topic-specific trainings. The National Environmental Health Association (NEHA) intended to deliver in-person trainings on food safety, including topics on professional food managers, food safety during natural disasters, and temporary food establishments. The increase in COVID-19 cases, however, forced PRDOH and project partners to find alternate delivery methods. The group decided that self-guided online trainings would be the best solution but this required NEHA to redesign the trainings, which introduced another set of challenges and delays. Nevertheless, NEHA worked diligently with its partners to overcome these challenges and the trainings are now available on NEHA's website for PRDOH staff to take at their own pace.

Despite multiple challenges, progress in Puerto Rico moved forward, with nearly all

Project Highlights: Making Inspection Data Useful

Going Digital

Puerto Rico Department of Health began converting paper inspection forms to digital, starting with the Radiological Division.

Performing 11,374 Inspections

- 356 radiologic facilities like dentists, clinics, X-ray centers, and hospitals
- 4,410 public/municipal and private drinking water facilities
- 6,608 food establishments

project activities completed on time. Progress of the project activities could only be possible through the teamwork of CDC, PRDOH, project staff, NEHA, the Association of State and Territorial Health Officials, FEMA, Americares, and the Food and Drug Administration. "We can only achieve success by respecting and valuing everyone's role on the team," says PRDOH Program Manager Aura Ortiz Sánchez. She demonstrated true resiliency by doing whatever was needed to keep public health a priority in Puerto Rico and helping department staff to manage the stress of their personal and professional responsibilities. As a result, the project activities have improved the island's capacity to respond to future emergencies. PRDOH has not only improved and updated infrastructure and equipment to help them do their jobs but also has staff with resiliency skills and the resources they need to serve their community.

For more information on CDC's disaster response and recovery activities for environmental health, visit www.cdc.gov/nceh/ehs/rra/index.html.

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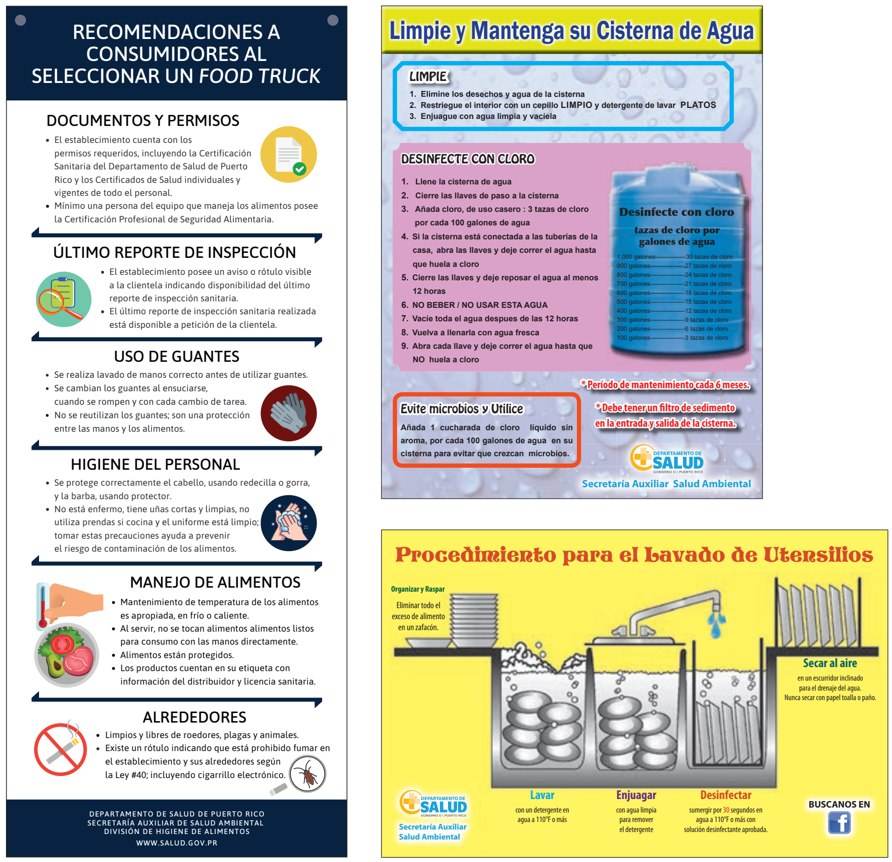
FIGURE **1**

Examples of Educational Resources to Improve Food Safety and Water Sanitation Developed by the Puerto Rico Department of Health



CAREER **OPPORTUNITIES**

Environmental Health Sciences Teaching Faculty Position

The Department of Environmental Health Sciences, School of Public Health at The University of Alabama at Birmingham (UAB) seeks applications for a dynamic teacher to join our department. The UAB School of Public Health is seeking to grow our educational efforts in the field of environmental and public health at both the undergraduate and graduate levels. Specifically, we are interested in applicants who can share their knowledge and dedication to environmental health with students both in and outside of the classroom.

We are seeking applications from individuals holding a PhD or DrPH in environmental health, public health, or a closely-related field; an MPH is strongly preferred for those with doctoral training in a discipline other than public health. **Demonstrated excellence in teaching is required for this position.** This can take the form of previous experience developing and teaching courses (independently or as a teaching assistant/secondary instructor), extensive experience preparing and delivering health education programs, experience preparing and delivering environmental health outreach and/or presentations, or leadership in a technical assistance capacity that involved interacting with large groups. All experience should be clearly documented in a teaching portfolio that should outline the applicant's teaching philosophy, an evaluation of their teaching skills, and details on teaching-related professional development activities. We encourage applications from those with knowledge in environmental health in areas such as environmental policy, toxicology, infectious agents, global environmental issues, climate and health, disaster preparedness and response, industrial hygiene, or food, air, and water safety.

This is a nontenure earning, full-time (12-month) position at the assistant or associate professor level with the potential for advancement in rank. Initial rank and salary will be commensurate with qualifications and experience. The expected teaching load is 4–6 courses per year (including summer). Courses will be assigned based on the applicant's interests or in response to programmatic needs. Teaching will be the primary responsibility, with additional scholarly activity being highly encouraged, especially activity that involves students. In addition, this position will require service to the department, school, and university.

The UAB School of Public Health's mission is to make positive and lasting change in the public's health through the pursuit of excellence in scholarship, teaching, and service to the larger community. Founded in 1978, the school has grown to 75 full-time faculty and 1,100 students. In 2019, the school had over $37 million in research funding, with roughly one half coming from NIH, and has been ranked in the top 20 NIH-funded schools of public health for the last 10 years.

Birmingham, Alabama, is a vibrant city, and along with the surrounding area, offers extensive cultural, dining, entertainment, and recreational options for people at all stages of life. As the home of the Civil Rights movement, Birmingham and the Deep South in general provide outstanding opportunities for high-impact public health education, research, and practice.

To apply, applicants must submit the following at https://uab.peopleadmin.com/postings/8765: a cover letter outlining how the applicant meets the specific criteria described above and their interest in the position, a curriculum vitae, and a comprehensive teaching portfolio, as discussed above. Letters of reference including at least one that addresses the applicant's teaching ability will be requested following initial review of application packets. Applicants selected for an on-campus interview will give a teaching demonstration that highlights their innovative approach to teaching diverse students.

UAB is an Equal Opportunity/Affirmative Action Employer committed to fostering a diverse, equitable, inclusive, and family-friendly environment in which all faculty and staff can excel and achieve work/life balance irrespective of race, national origin, age, genetic or family medical history, gender, faith, gender identity and expression, as well as sexual orientation. UAB also encourages applications from individuals with disabilities and those who are veterans.

EH CALENDAR

UPCOMING NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION (NEHA) CONFERENCE

June 1–2 and July 14–15, 2021: Parts 2 and 3 of the NEHA 2021 Annual Educational Conference & Exhibition Three-Part Virtual Series. On-demand access for Part 1 held on April 20–21 is available to all registrants. Visit www.neha.org/aec.

NEHA AFFILIATE AND REGIONAL LISTINGS

Colorado

September 14–17, 2021: 65th Annual Education Conference, Colorado Environmental Health Association, http://www.cehaweb.com

Indiana

September 20–22, 2021: 70th Annual Fall Educational Conference, Indiana Environmental Health Association, Lawrenceburg, IN, www.iehaind.org/Conference

Missouri

August 10–13, 2021: Annual Educational Conference, Missouri Environmental Health Association, Springfield, MO, https://mehamo.org

Texas

October 6–8, 2021: 65th Annual Educational Conference, Texas Environmental Health Association, Round Rock, TX, https://www.myteha.org

TOPICAL LISTINGS

Water Quality

August 24–26, 2021: *Legionella* Conference: Prevention of Disease and Injury From Waterborne Pathogens in Health Care (Virtual), NSF Health Sciences and NEHA, www.legionellaconference.org

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Did You Know?

NEHA has updated the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) exam, which will be released on September 1, 2021. The new REHS/RS exam will replace the current version that is being offered. Examinees will continue to take the existing exam now up through Tuesday, August 31, 2021. NEHA has posted an FAQ document and the revised blueprint of the exam to provide more information. You can also listen to recordings of town halls held over the last couple of months that explain the exam changes. Learn more at www.neha.org/rehs.

RESOURCE CORNER

Resource Corner highlights different resources the National Environmental Health Association (NEHA) has available to meet your education and training needs. These resources provide you with information and knowledge to advance your professional development. Visit NEHA's online Bookstore for additional information about these and many other pertinent resources!

Certified Professional–Food Safety Manual (3rd Edition)

National Environmental Health Association (2014)

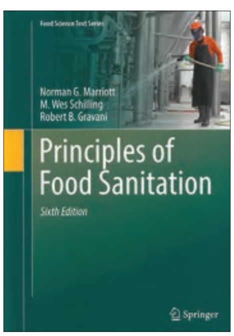
The Certified Professional–Food Safety (CP-FS) credential is well respected throughout the environmental health and food safety field. This manual has been developed by experts from across the various food safety disciplines to help candidates prepare for the National Environmental Health Association's (NEHA) CP-FS exam. This book contains science-based, in-depth information about causes and prevention of foodborne illness, HACCP plans and active managerial control, cleaning and sanitizing, conducting facility plan reviews, pest control, risk-based inspections, sampling food for laboratory analysis, food defense, responding to food emergencies and foodborne illness outbreaks, and legal aspects of food safety.

358 pages / Spiral-bound paperback

Member: $179 / Nonmember: $209

Principles of Food Sanitation (6th Edition)

Norman G. Marriott, M. Wes Schilling, and Robert B. Gravani (2018)



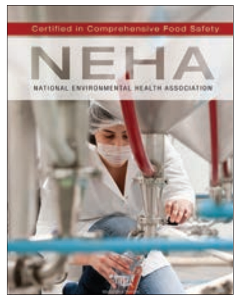
Now in its 6th edition, this highly acclaimed book provides sanitation information needed to ensure hygienic practices and safe food for food industry professionals and students. It addresses the principles related to contamination, cleaning compounds, sanitizers, and cleaning equipment. It also presents specific directions for applying these concepts to attain hygienic conditions in food processing or preparation operations. The new edition includes updated chapters on the fundamentals of food sanitation, as well as new information on contamination sources and hygiene, HACCP, waste handling disposal, biosecurity, allergens, quality assurance, pest control, and sanitation management principles. Study reference for NEHA's Registered Environmental Health Specialist/Registered Sanitarian and Certified Professional–Food Safety credential exams.

437 pages / Hardback

Member: $84 / Nonmember: $89

Certified in Comprehensive Food Safety Manual

National Environmental Health Association (2014)



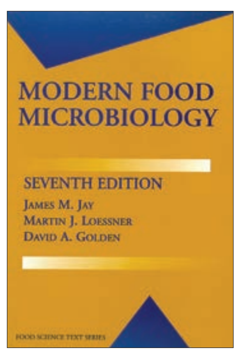
The Food Safety Modernization Act has recast the food safety landscape, including the role of the food safety professional. To position this field for the future, NEHA is proud to offer the Certified in Comprehensive Food Safety (CCFS) credential. CCFS is a mid-level credential for food safety professionals that demonstrates expertise in how to ensure food is safe for consumers throughout the manufacturing and processing environment. It can be utilized by anyone wanting to continue a growth path in the food safety sector, whether in a regulatory/oversight role or in a food safety management or compliance position within the private sector. This manual has been carefully developed to help prepare candidates for the CCFS credential exam and deals with the information required to perform effectively as a CCFS.

356 pages / Spiral-bound paperback

Member: $179 / Nonmember: $209

Modern Food Microbiology (7th Edition)

James M. Jay, Martin J. Loessner, and David A. Golden (2005)



This text explores the fundamental elements affecting the presence, activity, and control of microorganisms in food. It includes an overview of microorganisms in food and what allows them to grow; specific microorganisms in fresh, fermented, and processed meats, poultry, seafood, dairy products, fruits, vegetables, and other products; methods for finding and measuring microorganisms and their products in foods; methods for preserving foods; food safety and quality controls; and foodborne diseases. Other section topics include biosensors, biocontrol, bottled water, *Enterobacter sakazakii*, food sanitizers, milk, probiotics, proteobacteria, quorum sensing, and sigma factors. Study reference for NEHA's Certified Professional–Food Safety credential exam.

790 pages / Hardback

Member: $84 / Nonmember: $89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NEHA **NEWS**

NEHA 2021 General Election Results

By Angelica Ledezma (aledezma@neha.org)

Elections are a critical part of the democratic process and are one way to provide members a voice in the running of their organization. Voting members of the National Environmental Health Association (NEHA) have an opportunity to vote for candidates of contested board of directors and regional vice-president positions, as well as cast votes regarding proposed changes to the Articles of Incorporation and Bylaws. National officers of the NEHA Board of Directors serve a 1-year term in each officer position (second vice-president, first vice-president, president-elect, president, and immediate past-president) for a total of 5 years. Regional vice-presidents (RVPs) serve 3-year terms.

Eligible voters were encouraged to vote during the month of March and the deadline to vote was March 31, 2021. The following are results from the 2021 general election.

Second Vice-President

There were two qualified candidates for the second vice-president position: CDR Anna Khan, MA, REHS/RS, and Rachel Stradling, JD, BSc (Hons), CP-FS, REHS, MCIEH. All eligible NEHA members were asked to vote for the position of second vice-president and CDR Khan received the majority of votes. Both candidate profiles were published in the March 2021 *Journal of Environmental Health* (*JEH*) and on the NEHA website (www.neha.org/node/60552). CDR Khan will assume the second vice-president position in July 2021.

Regional Vice-Presidents

NEHA's membership is broken down into nine regions that represent U.S. geographic areas, as well as members in the U.S. military and abroad. The terms of three RVP positions expire in 2021—Region 2: Michele DiMaggio; Region 3: Rachelle Blackham; and Region 8: LCDR James Speckhart.

All three regions received only one eligible candidate and did not appear on the election ballot. All candidate profiles were published in the March 2021 *JEH*. Each of these candidates will automatically assume their RVP roles in July 2021 and their terms will expire in 2024:

- Region 2: Michele DiMaggio, REHS (Region 2 includes Arizona, California, Hawaii, and Nevada);
- Region 3: Rachelle Blackham, MPH, REHS (Region 3 includes Colorado, Montana, Utah, Wyoming, and all NEHA members residing outside of the U.S. [except members of the U.S. armed forces]); and
- Region 8: LCDR James Speckhart, MS, USPHS, REHS (Region 8 includes Delaware, Maryland, Pennsylvania, Virginia, Washington, DC, West Virginia, and all NEHA members of the U.S. armed forces residing outside of the U.S.).

Articles of Incorporation and Bylaws Changes

This past year, the NEHA Board of Directors discussed revisions to the language pertaining to the annual Affiliate Presidents Council. The revisions aimed to create more flexibility with planning the Affiliate Presidents Council, recognizing it may not always be possible to coincide the meeting of this group with an in-person NEHA Annual Educational Conference & Exhibition. The revisions also changed the format of reports from oral presentations during the meeting of this council to written reports distributed prior to the meeting to allow more time for discussion. The NEHA Board of Directors unanimously endorsed the revisions and voted in favor of sending the revisions to NEHA members for a vote, which were approved by a majority of the membership during the 2021 election.

A listing of current NEHA national officers and RVPs, along with state breakdowns for each region, can be found on page 38. More information about NEHA's governance, including its Articles of Incorporation and Bylaws, the election process, and associated deadlines, can be found at www.neha.org/about-neha/governance.

Thank you to all members who participated in this year's election!

DirecTalk
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cals in the air that were suspended in the stratosphere by well-intentioned engineers hoping to reflect solar energy back into space.

The decisions implemented today about food will introduce new challenges. A couple days ago, New Mexico and New York reportedly made the decision to liberalize the consumption of cannabis. It is just a matter of time before every state is seduced by the prospect of new tax revenue and follow suit in legalization. Edibles will be regulated. Third-party food delivery systems will be regulated. Virtual restaurants inspections will become standard operating procedure. The self-reporting of foodborne illness by individuals to nongovernmental sites will be the norm.

We will discover that 5G represents a health hazard to the public. Playground tire crumbs will be identified as a risk to children. Urban noise ordinances will become more common. New regulations will appear aimed at minimizing vehicle traffic and attendant emissions in urban cores. Active management of food waste will be introduced. We will discover new cancer clusters.

The proposed infrastructure bill winding its way from the White House to Congress has the potential to change the country's architecture. Renewable energy, mass transportation, and active living arrangements will become the cornerstones of our national way of life. Our inspection data will increasingly be used for learning and less for regulatory functions. We will become threaded to the clinical universe. Organizations, including our own, have already or will become more inclined to adopt results-only work environments. These developments will introduce chaos, new expectations, and open the doors to new ways of thinking about us, our profession, and the world around us.

Dr. Dyjack at Kensington Palace (left) and flowers honoring the passing of Diana, Princess of Wales, (right) in September 1997. Photos courtesy of David Dyjack.

These are my predictions and nothing more. What I believe is that every workplace is perfectly designed to achieve the results it gets. I would like to think that we can create our preferred future. Let us initiate the process of describing the environmental health program in the year 2100 and begin the arduous process of dreaming and communicating our vision, one that ensures healthy communities, healthy environments, and empowered professionals.

I envision a new, revitalized, and integrated approach to credentialing so we can escape the annual circus of state attacks on the credentialing enterprise. Representative Brenda Lawrence (D-Michigan) reintroduced the Environmental Health Workforce Act of 2021 on April 19, 2021. If passed, it will direct the U.S. Department of Health and Human Services to compare health outcomes in states that require a credentialed workforce with those states that do not. Here is our opportunity to bend the arc of the profession. The future is now.

Let us not default to someone else or some other organization to describe the future of our profession. We possess the ability to turn our raw talents into a precious commodity. If we desire to remain a strong and influential profession, we will need to change everything about us.

Dave

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Did You Know?

Assembled in 2020, the NEHA History Project Task Force was charged to study and review the rich history of NEHA and the environmental health field, as well as make that history available to all. A NEHA History Project webpage is now posted that highlights and shares the work of the task force, including an overview of the task force, an online virtual museum of artifacts from environmental health's past, electronic access to the "NEHA Green Book" that presents the history of NEHA's first 50 years, and much more. Check it out at www.neha.org/neha-history-project.

DirecTalk MUSINGS FROM THE 10TH FLOOR

David Dyjack, DrPH, CIH

Alchemy

If you want things to remain the same, then everything must change.

Conference calls at 6 a.m. are heinous, unless you are connecting with inspired colleagues from around the planet. The virtual relationships I maintain with professors Kirstin Ross, Toni Hannelly, Graeme Mitchell, Henry Dawson, and Matilde Rodriguez help keep me grounded, though I wish the biweekly sessions were scheduled at a more humane North American hour.

Our international breakfast club struggles with, and share ideas around, contemporary environmental health issues. Last week we discussed regulatory approaches to third-party food delivery, the vaccination performance of representative countries, and the mind-bending changes to the academic enterprise. The postpandemic new normal for university students is astounding. In some major colleges and universities there is *no expectation that in-class lectures or exams will ever return*. I ask you to reflect on that for a moment. Additionally, over the last year, many U.S.-based public health academic programs have suspended the GRE admission requirement. Anecdotal evidence suggests most will no longer require it. Who would have figured?

Societal shocks and stress can bring clarity to many enterprises and provide an opportunity to rethink or reconsider what is a traditional or customary practice. I recall with pride having an abstract accepted for the September 1997 International Occupational Health Association conference in Crans-Montana, Switzerland. The glee of presenting my research on the international stage was neutralized by the untimely death of Diana, Princess of Wales. Her passing occurred a few days before my departure for Europe and coincided with a personal visit I planned to bundle with my relatives in Richmond, which is just outside of London.

> *We possess the ability to turn our raw talents into a precious commodity.*

After arriving in the UK, I, like many others, made a pilgrimage to Kensington Palace to spend a few minutes to honor the life of a woman who lived her life in service, with emphasis on the public health scourge HIV/AIDS. The sight of tens of thousands of flower bouquets left in her honor are seared into my memory. If the life of one of the most famous and influential people in the planet can be snuffed out in a heartbeat, then there should be *no expectation that the constructs of my professional life as I know them will remain usual and customary into perpetuity*.

The current construct of our profession will inevitably undergo a renaissance, much as COVID-19 has recalibrated the academic universe, or a car crash can affect a monarchy. As I glance into the crystal ball, I sense some tsunamis headed in our direction. Please allow to share a few thoughts on what I believe is in store for us.

Climate change might reframe our core professional lives. The sudden stratospheric warming in February 2021 gave rise to the plunge and widening of the jet stream that devasted Texas, costing the state a cool $90 billion, according to informed estimates. Burst water pipes, mold, and a host of other environmental health challenges were created. Three European countries broke all-time temperature records in March 2021. This year was the earliest peak bloom of Kyoto's cherry blossoms in the 1,200 years of records that have been kept. Germany and the Netherlands recorded all-time high temperatures for the month of March.

You might ask, "So what?" Vectors such as ticks and mosquitoes will continue to evolve and migrate, presenting illness and disease in places unaccustomed to them. Drinking water distribution systems will increasingly require new and more sophisticated treatment and attention as ambient temperatures create ideal conditions for biofilm. Energy efficient buildings will exacerbate indoor air quality challenges for the world's population who generally spend 90% of their time indoors. Harmful algal blooms and warming temperatures will devastate coral reefs and transform the hospitality industry. Environmental health professionals might spend more time inspecting and validating carbon scrubbing systems and analyzing the chemi-

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