



Risk Communication is Important for Environmental Engineering during COVID-19

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Risk “is the possibility of an unfortunate occurrence” (SRA 2018b). The study of risk, and its mitigation, is risk analysis, and includes assessment, characterization, communication, governance, management, perception, and policy of risks to individuals, to public- and private-sector organizations, and to society at local, regional, national, or global levels (SRA 2018a). Assessing the significance of a risk, developing interventions to manage a risk, and communicating both the significance and the interventions is a responsibility of professional engineers who have an ethical obligation to “hold paramount the safety, health, and welfare of the public” (NSPE 2019). Environmental engineers, in particular, understand the importance of engaging successfully with the public in risk communication—lessons we have learned from industrial tragedies such as the 1984 Bhopal disaster and municipal tragedies such as the 2014 Flint, Michigan, water crisis.

COVID-19

In January of 2020, the World Health Organization (WHO) declared a Public Health Emergency of International Concern in response to the global spread of the SARS-CoV-2 virus and the emergence of COVID-19 symptoms. Under their leadership, the guidance “Risk Communication and Community Engagement Readiness and Response to Coronavirus Disease (COVID-19)” was distributed. These tools were designed using lessons learned during past major public health events and emphasized that “risk communication and community engagement is integral to the success of responses to health emergencies. . . . Failure to communicate will lead to a loss of trust and reputation, economic impacts, and—in the worst case—loss of lives” (WHO 2020).

Practically speaking, risk communication should be clear, consistent, and concise. It should also be useful to diverse health professionals—including environmental engineers—as well as to the public—both in terms of informing individual and community behaviors as well as in the understanding of government policies. Unfortunately, poor risk communication has been a repeated failure of the COVID-19 pandemic. We identify how risk communication around the concepts of

- flatten the (epidemic) curve;
- social distancing;
- Personal protective equipment (PPE); and
- COVID-19 deaths

have contributed to confusion and engendering a lack of trust among the public; exactly the opposite of the communication needed to encourage individual and community behavior change and maintain an informed public.

Clear

When transmission of the virus exceeded containment, which could be achieved with contact tracing and quarantine, the debates within national health authorities shifted from an emphasis on containment to an emphasis on mitigation. By mid-March 2020, epidemiological models suggested that deaths in the United Kingdom would exceed half a million people, while deaths in the United States would exceed 2 million people, unless extreme measures of mitigation were undertaken (Adam 2020). Initially, the closing of universities and ultimately the issuing of orders for nonessential workers to shelter in place or stay at home (in the US) or lockdown (in the UK) were all used in an effort to flatten the (epidemic) curve. As originally shared with the public, the primary goal of flattening the curve is to “delay the exponential growth in incident cases and shift the epidemic curve to the right in order to ‘buy time’ for production and distribution of a well-matched pandemic strain vaccine” (CDC 2007). Many of the general public now believe that relaxing lockdown to reopen the economy will result in a return to the runaway spread of the virus, while others believe that no further mitigation measures are needed because the curve has been flattened. Both of these extreme beliefs are wrong. In fact, the latest advice reemphasizes the value of containment, with WHO special envoy for COVID-19, Dr. David Nabarro, claiming “test, track and trace and isolate” are essential (Evans 2020).

“Flatten the curve” is an example of unclear risk communication. In the UK, confusion has been compounded by misleading and inappropriate expression of the aims and by changing slogans midpandemic. Initially, one of the expressed aims of lockdown was to “protect the NHS” (the UK’s universal coverage, state-sponsored National Health Service), and saving lives was presented as a secondary aim (Johnson 2020). However, once the necessity to begin lifting the lockdown became apparent, the purpose of the residual measures was redefined by the exhortation to “stay alert” (UK Government 2020), with little indication of what this meant.

Consistent

Inconsistency in risk communication during COVID-19 includes the terms *social distancing* and *PPE*. Mental health experts have warned that the use of the term *social distancing* should be replaced with the term *physical distancing* so that people remain “socially connected” while “physically separated” (Banks 2020). Regardless of the validity of this claim, switching terms during a global pandemic creates confusion and unnecessary distraction among the public who need to be focused on behavior change rather than the appropriateness of slogans and catchphrases.

PPE is another area where risk communication has been inconsistent. Early in the pandemic, members of the public were told that

there was no need to wear any type of face mask because limited supplies of PPE needed to be reserved for first responders and improper use of PPE provided limited protection against the acquisition of a viral infection. As the pandemic evolved, members of the public are now being told to wear a cloth face masks to protect transmission from asymptomatic carriers (Brainard and Hunter 2020). This second use of a face mask—protecting the public from transmission from asymptomatic carriers—is NOT personally protective (rather it is protective of the public), and therefore the current public guidance to wear a cloth face mask is, strictly speaking, NOT a form of PPE. This has led to confusion in the public where some perceive the use of a cloth face mask as virtue signaling (Kolstoe 2020a) and a sign of submission to government control, while others perceive the failure to wear a cloth face mask as a sign of selfishness.

Concise

Finally, risk communication should be concise, and here we note that the daily tally of COVID-19 deaths fails the public in this regard. Some members of the public share the view that COVID-19 deaths are limited exclusively to deaths directly related to fluid in the lungs of patients with viral pneumonia. Health professionals and other members of the public use a more expansive definition of COVID-19 deaths that includes excess deaths, based on historical trends, as well as deaths that occurred during the COVID-19 pandemic (i.e., victims of other illnesses who did not seek proper, life-saving medical attention, during the pandemic—either from the lack of access to healthcare or fear of accessing the healthcare system). Furthermore, because SARS-CoV-2 infections result in a significantly greater likelihood of death in susceptible subpopulations, reporting total COVID-19 deaths creates the false impression of only a few deaths among a larger general population rather than a more accurate impression of a significant proportion of deaths among a much smaller susceptible population.

In a similar vein, governments have promoted an overoptimistic view of vaccination and testing. First, they have invested too much hope in the fact that a vaccine can be developed when, in fact, the likelihood is uncertain (Kolstoe 2020b). Then, testing is presented as a panacea without explaining that testing can take place at both ends of an infection: while a person is infected—for the virus—and after an infection—for purported immunity in the form of antibodies. Such advocacy is undermined further by spurious claims that such tests can be 100% effective (Collier 2020) when this is in fact impossible. The subtleties related to the fact that the virus has not been isolated, does not meet the definition of Koch's postulates for an infective agent (Last 2007), and that any 100% effective test must be producing a high level of false positives may be beyond the grasp of the general public. But, to both convey and mitigate risk, false information leading to false hope does not help.

Importance

Engineers who graduate from Accreditation Board of Engineering and Technology (ABET)-accredited programs should demonstrate proficiency in engineering design as well as effective communication (ABET 2020). Engineering design explicitly includes the

consideration of risk, and effective communication explicitly includes a range of audiences—such as other professionals as well as the public. For environmental engineers, risk communication is a vital part of preprofessional training and professional practice. The COVID-19 pandemic has demonstrated that failure to provide clear, consistent, and concise risk communication creates challenges to the work of interprofessional health practitioners, including environmental engineers, and also creates confusion in the public. We encourage practicing professional engineers, as well as those training preprofessional engineers, to emphasize the importance of clear, consistent, and concise risk communication as an essential aspect of holding paramount the safety, health, and welfare of the public.

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