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COVID-19 Risk and Crisis Communication Challenges and Opportunities: Qualitative Insights from Rural Wastewater Surveillance Partners

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Brief Report

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Abstract

Objectives: Understand perceptions of COVID-19 messages and information sources among rural wastewater treatment plant operators to inform context-specific communication strategies for implementing wastewater surveillance methodologies locally.

Methods: Eight employees from 7 Eastern Kentucky facilities involved in SARS-CoV-2 wastewater surveillance participated in semi-structured interviews. Respondents shared perceptions of traditional and social media COVID-19 information channels in their communities, as well as factors influencing trustworthiness of sources. Using the U.S. Centers for Disease Control and Prevention's Crisis and Emergency Risk Communication (CERC) framework, 3 investigators conducted iterative, thematic coding of interview transcripts.

Results: Respondents' statements most frequently related to "Be Credible," "Be Right," and "Promote Action" CERC constructs, while mixed messages, high volumes of information, and numerous sources undermined trust in COVID-19 information.

Conclusions: Understanding the relative importance of CERC constructs and their distractors may improve future risk communication to advance infectious disease surveillance strategies in rural contexts.

The COVID-19 pandemic in the United States has highlighted a divide between what public health leaders advise and what members of their communities choose to do.[1] Although slow or limited uptake of some public health recommendations may relate to limited information availability, other challenges may relate to specific communication strategies contributing to a breakdown in public health implementation. The variable uptake of evidence-informed measures in rural areas raises questions about how pandemic messaging has been received among local populations in these frequently under-resourced areas. Because successful adoption and/or adaptation of emerging pandemic surveillance and mitigation strategies requires not only local buy-in but also active participation from community partners, it is critical to build situational awareness of factors influencing sensemaking among potential partners in rural areas.

Growing interest in wastewater-based epidemiology[2] requires a better understanding of how local cultural and informational contexts may contribute to implementation challenges and opportunities. This study helps address this gap by examining perceptions of COVID-19 risk communication among rural Kentucky wastewater treatment plant (WWTP) operators, a community of practice whose collaboration is critical for successful SARS-CoV-2 wastewater surveillance.[3] Because the U.S. Center for Disease Control and Prevention (CDC) National Wastewater Surveillance System is operated on a volunteer-only basis,[4] understanding the perceptions of WWTP operators is vital to recruiting and retaining them as community partners.[5]

To improve our situational awareness of potential communication and trust-related challenges during rural wastewater surveillance implementation, we asked operators about COVID-19 pandemic communication, analyzing responses using CDC's Crisis and Emergency Risk Communication (CERC) framework to understand how and why interview participants may have formed conclusions about official COVID-19 public health guidance.[6] The CERC framework delineates 6 foundational principles for officials to follow when communicating about high-stakes health risks. These principles are "Be First," "Be Right," "Be Credible," "Express Empathy,"

"Promote Action," and "Show Respect." They guide public health officials in developing and delivering messages to a variety of lay publics.[6]

Methods

The University of Kentucky Institutional Review Board approved the study protocol (#64376). All participants provided written informed consent prior to their interviews.

The team used purposive sampling to select interview participants from 7 of 10 rural WWTPs providing samples for a wastewater surveillance study. We conducted interviews between October 2021 and February 2022. We conducted 2 interviews at 1 WWTP to ensure inclusion of a female operator; otherwise, we interviewed 1 operator at each facility. Leadership at 1 WWTP declined to have their personnel interviewed. One participant was interviewed twice due to a recording error; only the second interview was used in the dataset as it was nearly identical to the first but provided some additional insights valuable to understanding perceived trustworthiness of COVID-19 information.

Participating WWTPs serve rural, mountainous counties with populations ranging from ~14 000-48 000. These counties face socioeconomic disparities, with median household incomes and educational attainment at or below national and state averages. In addition, the region suffers health disparities across several dimensions that result in greater morbidity and mortality, as well as higher numbers of premature deaths, than national and state averages.[7]

The interview protocol was developed by a team that included investigators with expertise in public health, community medicine, risk communication, and qualitative research methods. The draft interview guide was pilot tested with a research team member who resides in Appalachia. The interview guide was refined for clarity following the pilot test. The first author, who had established trusting relationships with WWTP operators through her weekly sample collection role for the broader wastewater surveillance study, conducted all interviews. An experienced infectious disease case investigator, she conducted interviews via Zoom, telephone, or in-person. Interviews lasted between 8-20 minutes (average 12.8 minutes). Every participant responded to 15 questions concerning perceived trustworthiness of COVID-19 information sources, perceived COVID-19 information gaps in their communities, and perceptions of communication channels used locally for obtaining COVID-19 information. The audio recording of each interview was transcribed verbatim using NVivo 12 (QRS International) software. Transcripts were coded independently by 3 research team members, including the researcher who conducted the interviews, using NVivo 12 coding software for open and axial coding.[8]

Our team mapped interview data to constructs from the CDC CERC framework, while also examining perceptions of specific COVID-19 information sources. We then performed iterative thematic analysis of data.[8] Themes related to CERC principles were derived deductively from the data, while open coding allowed for the inductive inclusion of emergent themes.[8] Team members met multiple times via teleconference to discuss and iteratively revise the codebook. This approach is consistent with Consensual Qualitative Research, which posits that a team of coders analyzing data first independently, then coming to a single unified analytic vision through dialogue can reduce individual bias while strengthening the team's ability to capture the complexity of the data.[9] To further enhance rigor, member checks were conducted with respondents, who reviewed and provided feedback on preliminary findings.

Results

Among the 8 people interviewed, 7 were white/non-Hispanic male residents and 1 was a white/non-Hispanic female resident of rural Appalachian eastern Kentucky. All respondents were employed by a municipal WWTP. The demographic homogeneity of wastewater plant operators reflected the demographics of the region and profession.

In reference to COVID-19 mitigation communication, we found that respondents most often made statements related to the "Be Credible," "Be Right," and "Promote Action" CERC constructs. References to these 3 constructs accounted for 88% (29/33) of the references mapped (Table 1). The "Show Respect" construct had no mapped thematic data. Quotes related to "Be Credible," "Be Right," and "Promote Action" are in Table 2.

Thematic analysis indicated that multiple factors - including large volume of information, large number of information sources, and misinformation – contributed both to uncertainty about where to find reliable COVID-19 information and to distrust in messages.

Respondents were asked to share their perceptions about how best to communicate health risks with their communities. Several responses reflected credibility challenges for both messages and messengers, indicating that tailored approaches may be more effective. One respondent noted, "I think everything needs to be community driven. You can't make change from the top down." Another respondent noted, "… national news is less trustworthy than your local news." A third respondent acknowledged the struggle their community had finding what they would accept as credible information, explaining, "…the fact that we are still very somewhat [sic] rural area, and there's a lot of misinformation that's out there on the internet, television, that sort of thing… [P]eople around here just really don't know what media sources to trust…" Another respondent pointed out that inconsistent messaging also made it difficult to know what information was credible, stating, "… 'Wear a mask, don't wear a mask, wear a mask, wear 2 masks, wear a mask indoors, don't wear a mask outdoors, wear a mask outdoors," and adding, "… there's got to be some kind of consistency to the message, or it's completely lost."

Some respondents indicated that information from local hospitals and public health experts was not necessarily deemed

Table 1. CERC construct code counts

CERC construct code counts		
CERC construct	#Of interviews referencing construct	Total references to construct
Be Credible	8	15
Be Right	4	8
Promote Action	3	6
Be First	1	2
Express Empathy	1	2
Show Respect	0	0

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Table 2. Exemplar quotes

Exemplar quotes	
CERC Construct	Exemplar Quotations
Be Credible	"A lot of times I also think that it's sort of like the telephone game, where I don't know if [spokespeople are] going shorthand…"
Be Credible	"I think most [community members are getting COVID information by] word of mouth. So, social media. I think most of them are. I know a lot of them are, maybe they subscribe to 1 of 2 different news sources and it's solely one or the other, and both news sources generally don't solely just put out fact. They add… the fact, but then they throw in [unintelligible] as well, and it kind of skews what the reality of everything is."
Be Credible	"I think the community has to be community driven, has to be local, has to be… [COVID–19 information] has to be from our community leaders, backed with facts, from facts from like, say, [we're] doing this. I say this is what we're doing. We're studying this. We're doing this. We're doing this in conjunction with [state academic institution]. We're doing this with the CDC. We're doing this with the Water Environment Federation, you know, these kinds of things…. I think everything needs to be community driven. You can't make change from the top down. It's always a grassroots. It's always gonna be community driven. "
Be Right	"[T]hey kind of ad lib, and put opinions instead of just facts. We just need facts."
Be Right	"I think [community members] don't trust [mainstream media] because of the flip-flops on the information and, you know, I know that things evolve… But this -- the constant change --you know, give us some basis."
Be Right	"I think the [local] health department numbers are about the most accurate, but that's the ones that I believe."
Promote Action	"Well, really, if there was something that we could do to protect ourselves from it, which I don't… not necessarily 100 percent on board with the masking. I don't think the masking is all that great. Just washing your hands, basic sanitation, just washing your hands and not being in someone else's space. I think if people would just follow guidelines like that, they would be safer. But I don't think that people use their common sense."
Promote Action	"Well, I guess if you can detect a new… like a new variant, then you could be able to warn the public about it, and how easily it's transmissible and steps they can take to prevent it better."
Promote Action	"I've thought about this, you know, if we're, if we're testing and we can see things better real time, that would be able to get our leaders, our community leaders and officials and stuff to be able to get quicker response, be more proactive and 'Hey, we need to lock down, we need to do this' or 'Hey, everybody, make sure you're masked up' [so community members] know [to] stop going to the stores without a mask. Sort of like a reinforcement point. You gotta do this stuff with kids, but sometimes you have to do stuff with adults as well."

credible. Specifically, 1 participant questioned mortality data: "I think [community members] probably trust the hospital because… they're the ones that are treating the patients… But there's also a lot of information out there…that you don't know if it's true or not that no matter what you die of… they're going to turn it in as COVID to get that money."

Additional themes emerged as potential mediators of trust. For example, political party affiliation of public health messengers influenced the perceived trustworthiness of their COVID-19 messages. Several respondents indicated a low level of perceived credibility in COVID-19 messengers due to their status as an elected official and/or partisan affiliation. When asked if they watched press conferences to obtain information about COVID-19, 1 respondent noted, "I did at first when… they had [Dr. Fauci] and President Trump on there, but since then, I don't pay much attention to 'em." Another respondent acknowledged, "When it comes to politics… [members of my community] won't trust the other side." Additional evidence of distrust of elected officials and government agencies was exemplified by a participant who responded "Oh, you don't believe nobody in politics, especially the state governments… They lie about one thing, they lie about everything else."

One respondent recognized the need for actionable mitigation measures like wastewater surveillance: "…if we're testing and we can see things better real time, [we] would be able to get our leaders, our community leaders and officials and stuff to be able to get quicker response, be more proactive."

Discussion

This study described perceptions of COVID-19 messages and messengers by wastewater treatment plant operators in eastern Kentucky and used the CERC model to understand potential communicative drivers of these perceptions. We found that most respondents expressed difficulty trusting public health information, which may contribute challenges for implementing rural wastewater surveillance initiatives in the future. A key factor contributing to mistrust among respondents was the perceived absence of credibility among messengers.

Within the CERC framework, credibility is characterized as an unwillingness to compromise on honesty and truthfulness.[6] Interestingly, credibility is the only CERC construct that cannot be controlled for when designing message content; it is mediated by receiver perceptions of the messenger. However, perception of the messenger as an expert may not confer credibility if the experts' opinion is in contradiction with an individual's worldview.[10] If the perceived absence of credibility encourages mistrust, public health leaders must proactively develop new and shared understandings regarding the establishment and maintenance of messenger credibility. This task begs the question of *what* factors make health messages and messengers credible for rural audiences and further centers local contexts when designing and implementing wastewater surveillance and other pandemic mitigation strategies.

Our findings align with growing evidence that those who present themselves as experts in public health, medicine, and public policy cannot assume that they will be perceived as credible.[10] Information, such as mortality data, that experts may assume is incontrovertible, may generate skepticism, as exemplified by a participant who asked, "…[C]an we really believe all the numbers?" Further research is needed to determine mechanisms that bolster the credibility of both health information and messengers in rural communities amidst challenging sociopolitical climates.

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Limitations

The small sample size (N=8) and qualitative nature of this study limit the generalizability of our findings; however, the results provide transferrable insights for teams seeking to implement wastewater surveillance in similar settings and populations. While demographic homogeneity may have contributed to relative response uniformity, this homogeneity largely reflects the demographics of the region, predominantly white non-Hispanic, as well as demographics in the profession.[7]

While respondents' knowledge of the interviewer's role as a COVID-19 wastewater surveillance researcher may have influenced responses, community-engaged qualitative research recognizes the benefits arising from the process of building relationships among researchers and participants.[8]

Conclusions

This study highlights that perceived credibility is critical for successfully communicating health risks to the public. Additional research is needed to elucidate which combinations of message, messenger, and dissemination strategies increase the perceived credibility of information for rural audiences, particularly in cases of emerging and quickly evolving scientific evidence. Emphasizing CERC constructs related to credibility, accuracy, and action when developing messaging strategies may benefit communication effectiveness for public health-focused teams seeking to implement pandemic wastewater surveillance strategies in the rural US.

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