ORIGINAL RESEARCH

# Communication Practices to Support Frontline Workers During Public Health Threats

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**Abstract:** *Background:* Public health threats (PHTs) influence how and in what ways managers communicate with employees. Employee resources and information during uncertain times has been noted as a reoccurring gap, especially as it relates to personal protective equipment (PPE). This study explored general and PPE-specific communication practices with 22 healthcare and emergency medical service (EMS) managers to support workers, particularly in the context of preparedness and response. *Methods*: Data collection occurred in two phases that involved interviews and small group discussions to identify, examine, and better frame and execute communication practices. Qualitative analysis was informed by the 4i FACT framework and the social ecological model (SEM) to identify relevant communication practices and intervention points within health delivery settings. *Results*: Results elucidated perceived, effective leadership practices and interpersonal influences in the workplace. Tangible leadership communication practices were identified as important intervention points within the SEM, with a focus on proactive behaviors to procure necessary PPE and disseminate information. Participants emphasized one-on-one interactions with employees, and the use of trusted messengers to share health-related messages. They also highlighted the challenges of PPE shortages and the importance of access to resources across different job roles, organizations, and work settings. *Conclusions/Application to Practice*: This study contributes insights into communication practices during a public health emergency, offering a nuanced understanding of managerial approaches, PPE-related communication, and the broader contextual factors influencing information dissemination. Further, the integration of frameworks like 4i FACT and SEM provides a structured perspective for future communication strategies, supporting tailored approaches across organizations.

**Keywords:** 4i FACT framework, healthcare, personal protective equipment, public safety, qualitative data, public health threat, social ecological model

The information available at the onset of public health threats (PHTs) influences decision making among organizations and employees (Chan et al., 2018; Stefanidis et al., 2017; Vraga & Jacobsen, 2020) who often turn to their managers for information. This increases the need for effective communication from leadership during times of uncertainty (Dwiedienawati et al., 2021; Van der Meer et al., 2017). During the COVID-19 pandemic, quickly evolving information and limited supplies of personal protective equipment (PPE) contributed to elevated levels of uncertainty and distress among healthcare personnel (HCP) and emergency medical service (EMS) personnel (Mokhtari et al., 2020; Robins-Browne et al., 2022; Rocha et al., 2023). Research (Van Bavel et al., 2020) described the need for managers to navigate: (1) differing social and cultural contexts, (2) improving scientific communication, and (3) providing social and emotional support.

Employees' reliance on information and how it is communicated is challenging because managers must make decisions during their own uncertainty while needing to quickly adapt approaches for their workforce (Sundelson et al., 2023). Evolving information during PHTs hinders the implementation and communication of PPE-related guidance (Figueroa et al., 2023). In the current study, healthcare and EMS managers shared challenges and approaches to effective communication during the COVID-19 pandemic. Study results identify transferrable strategies situated within an ecological framework that may focus communication and implementation practices during times of uncertainty.

## An Ecological Framework for Advancing Communication Practices

*Communication practices* involve "talking and listening, writing, and reading, performing, and witnessing, or more generally, doing anything involving 'messages' in any medium or situation" (Craig, 2006, p. 39). In the workplace, communication practices can be described as recognized activities and topics around a type of discourse. Managers' communication practices can serve as an antecedent to enhance

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### Applications to Professional Practice

Results provide applied guidance using the social ecological model. Health organizations and leaders can use these results to identify trusted sources of information and ensure that messages are tailored to different situations, groups, and shifts to avoid information overload. Specifically, leaders can create a shared understanding about the effectiveness of personal protective equipment (PPE). Examples of false information can be shared to prompt accurate conversations and empower workers in their selection of respirators. The use of infographics and visual aids may help improve trust in the efficacy of respiratory protection. Accountability and empathy are important leadership practices. Empathy training for managers may improve communication and build trust. Lastly, flexible messaging is needed to meet the needs of all workers, especially those in rural areas.

worker comprehension, accountability, support, and behaviors (Amah, 2018; Park & Park, 2023). While the impact of managers' communication practices on employees' perceptions has been documented (Haas, 2020), including emphasizing PPE (Dean, 2014; Haas et al., 2024a), research has not focused on supportive PPE communication practices.

Public health emergencies can influence managers' communication with employees. During the COVID-19 pandemic, organizations used multiple channels (e.g., email, intranet, town halls, virtual meetings, etc.) that were not empirically evaluated for effectiveness (Sanders et al., 2020). To inform a standardized approach to leadership communication, Sundelson et al. (2023) conducted a scoping review of communication management tools and strategies used during previous PHTs. They proposed the 4i Framework for Advancing Communication and Trust (FACT), based on the social ecological model (SEM; Figure 1; Golden et al., 2015). The SEM helps identify appropriate intervention points within a system (Sallis et al., 2015). Figure 1 and Table 1 show the models' overlapping levels, describing approaches for managing health-related communication. Taken together, the 4iFACT framework and the SEM may be used to guide the identification and assessment of effective communication practices at various interaction levels across organizations to support worker wellbeing.

#### *Objective*

To the authors' knowledge, no study has assessed managers' communication practices during PHTs to determine ways to support workers. Such research is timely because it has been challenging for workplaces to manage information and outreach strategies (Sundelson et al., 2023), especially regarding ways to instill employees' efficacy in PPE (Real et al., 2021). Consequently, this study sought to identify managers' communication practices during the COVID-19 pandemic, including practices specific to PPE, to support employees and minimize uncertainty.

## Methods

### Design

Because managers' communication practices during PHTs was largely unexplored, researchers used qualitative methods to support a more in-depth investigation. Qualitative methods are particularly useful when studying lesser-known areas for inquiry (Miles et al., 2020) and deemed necessary to ascertain not only what communication practices managers used but also why these practices were chosen, and how they may have impacted employee perceptions and efficacy regarding PPE.

### Instrument and Data Collection

An interview question guide was developed based on results from previous data collection activities (Haas et al., 2024a; Haas et al., 2024b) to expand on possible communication and leadership practices. Questions were open-ended and probed motivators for work-related PPE use, differences in at-work and personal PPE use, the influence that a long-standing public health emergency had on workplace conversations, protocols, and personal decisions regarding PPE use, and health, safety, and well-being procedures, including the implementation and enforcement of such procedures including respiratory protection programs (RPPs). Information on perceived employee knowledge, attitudes, behaviors, and beliefs that influenced how participants implemented or adopted respirator use procedures were also discussed.

Prior to data collection, this activity was reviewed and approved by the CDC as exempt human subjects research (See 45 C.F.R. part 46.104). Data collection with healthcare and EMS representatives occurred in two phases using snowball and purposive sampling recruitment strategies (Parker et al., 2019). Discussions occurred virtually and were not recorded to avoid perceived privacy concerns that may have impacted the detail in responses provided among participants, especially within group discussions.

Two researchers were present for each discussion with one facilitating and the other taking comprehensive notes. Follow-up memos to improve recall of participants' experiences were also used. Thematic analysis used deductive and inductive approaches during both phases (Miles et al., 2020). Saldana's (2016) two-cycle process was adapted to guide the coding process and intercoder reliability, discussed in subsequent sections.

### Phase 1 Participants

Phase 1 consisted of eight interviews/small group discussions with 12 individuals between January and June 2023.

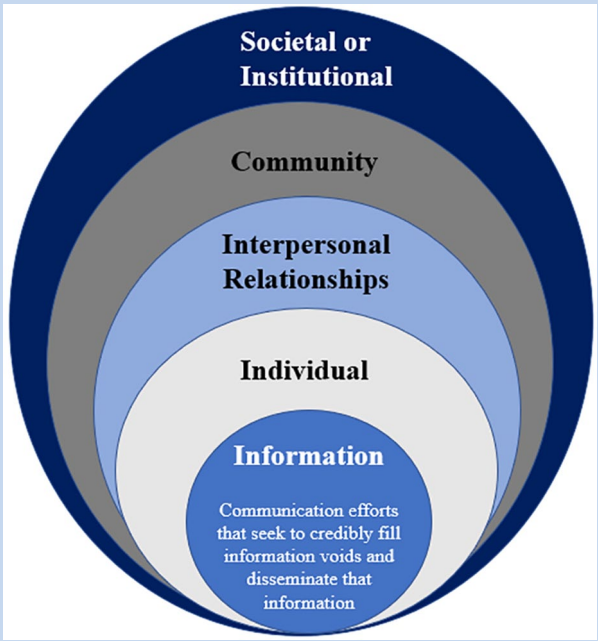


**Figure 1. Combined illustration of the 4i Framework for Advancing Communication and Trust and the social ecological model (adapted from Sundelson et al., 2023)**

Table 1. Main Concepts of the 4i FACT Framework and Social Ecological Model

| Level | Social ecological model (Sallis et al., 2015) | 4i FACT framework (Sundelson et al., 2023) |
|---|---|---|
| Information | Not typically represented | Approaches and tools to create and disseminate accurate messages to aid decision making (e.g., social media campaigns, worker-manager interactions). |
| Individual | • Individual workers interpret, develop, and maintain decisions and behaviors that reduce health and safety risks. | • The design and use of tools and approaches to increase individual-level resilience to combat ambiguity. |
| Interpersonal | • Interpersonal characteristics influence behavior (e.g., personal relationships with managers or coworkers). | • People who distribute information to target audiences, such as managers providing information to employees (i.e., micro-influencers). |
| Community | • External characteristics influence behavior (e.g., organizational rules and policies, engagement in programs) and social norms impact workers' perceptions. | • Reliable mechanisms to distribute information to target audiences (e.g., publicly available, and vetted toolkits). |
| Institutional/Societal | • Cultural contexts and regulatory policies such as those from the Occupational Safety and Health Administration (OSHA) influence worksite policies and ultimately, decision making among workers. | • Approaches to identify, improve, or provide tools and processes that can support information implementation (e.g., enacting policies that support communication literacy). |

Originally, researchers estimated that 10 interviews would trend toward saturation among this homogenous, narrow group of leaders in health delivery settings based on previous data collection around a similar topic (Haas et al., 2024a). In combination with the *meaning saturation* achieved (discussed in the analysis), researchers were comfortable with the Phase 1 sample.

Discussions lasted between 40 and 75 minutes (M = 54 minutes) with one to three participants present on each call. Participants' job titles included vice president of clinical services; EMS nurse practitioner, coordinator, director, or chief; infection prevention coordinator; and physicians and registered nurses in leadership positions. Participant roles and responsibilities included: (1) managing infection prevention; (2) procuring and distributing PPE; and (3) supporting RPP development and implementation via fit testing, training, and education.

## Phase 1 Coding

During first cycle coding, one researcher completed initial and focused coding, reading text line-by-line to identify emergent ideas and perceptions (Saldana, 2016) related to communication practices. During initial coding, several communication practices were identified along with the perceived effectiveness of those practices in action. The communication practices were coded as broad "inputs" during the initial coding and then the perceived "outputs" (i.e., perceived effectiveness or impact) on employee perceptions were described, if provided. Then, focused coding occurred to pattern and group more specific communication practices and processes both generally and related to PPE of initial "input" codes were reread and coded "Changing/fluid communication methods." Then example impacts with abridged quotes from participants were used to support the code identified.

A 16-page codebook containing the codes and interview excerpts to support the development and operationalization of the codes and overarching themes was compiled in Microsoft Word. Codes were shared with another researcher with deidentified notes and memos for additional review, discussion of the codebook, and final verification. Beyond individual coding and interrater coding efforts, researchers met approximately eight times between August and September 2023, spending approximately four hours discussing the codes and themes. Most of these interrater discussions focused on negative case analyses to prevent premature conclusions or confirmation bias within the data (Fife & Gossner, 2024). However, in some cases a communication input code resulted in a positive outcome and no negative outcome or vice versa. Therefore, the code might have been retained but a note was made that saturation was not prevalent in all output portions of the codebook and that it was still relevant to the evolving storyline. Examples of this occurrence are discussed in the results section.

Next, researchers deductively analyzed the data using constant comparison and theoretical coding approaches (Saldana, 2016). They further categorized results documented within the codebook using the 4i FACT and SEM frameworks to determine what types of communication practices, as situated within the 4i FACT, were being used by leadership and within which SEM level(s) those practices fit. Researchers met throughout October 2023 to further refine the codebook, assigning aspects of the 4iFACT and levels of the SEM to the already coded categories and themes. Throughout this latter theoretical coding, researchers could readily ascertain the shared experiences and practices among participants. However, specific examples of communication practices during field deployment were lacking. This finding prompted Phase 2 data collection.

## Phase 2 Participants

The original interview guide had questions about implementation, but they were not probed in as much detail during Phase 1 data collection. Consequently, the Phase 2 discussions followed up on the interpretation of Phase 1 data to finalize the codebook's utility. Researchers wanted to gather more tangible examples to expand the "code meaning" (i.e., full understanding of the issues discussed to provide meaningful action) (Hennink et al., 2017; Hennink et al., 2019) identified in Phase 1. According to these authors, this is useful as an incremental method to ensure data reliability and validity in the results. Phase 2 recruitment occurred using snowball sampling with those who participated in Phase 1. Phase 2 consisted of two discussions (two and eight participants, respectively) in November 2023 of approximately 55 minutes duration. Jobs and responsibilities were like those for Phase 1 participants (e.g., medical doctors, nurse educator, and EMS department heads).

## Phase 2 Coding

Phase two topics expanded on previous discussions in Phase one; however, data collection was more focused on examining tangible communication practices and verifying how these practices may have influenced worker perceptions. This process involved checking, confirming, and ensuring the accuracy of previously identified themes (Morse, 2015). Subsequent phases of initial and focused coding occurred as described in Phase one to identify patterns of leadership support and communication around health and safety management specific to PPE.

During constant comparison coding of the Phase 1 and Phase 2 data, researchers expanded the codebook to clarify the "outputs" of the communication strategies discussed and whether the outputs had a positive or negative perceived impact on frontline workers as well as the perceived impact on the organization's culture in general. Distinguishing the prevalent outcomes of each communication practice helped further assess and situate them within the two models to identify possible intervention points. See Table 2 as an example of this iterative Phase 1 and Phase 2 coding.

Table 2. Examples of "Outputs" Coded in Response to Communication Practices About Available PPE

| Theme: Role of PPE on worker wellbeing | | | |
|---|---|---|---|
| **Communication input** | **Output—positive impact on worker** | **Output—negative impact on worker** | **Output—impact on organization** |
| Communicating about available PPE | • PPE was a safety net<br>  ○ Happier<br>  ○ Reduced stress<br>  ○ Autonomy<br>• Transparent re: availability<br>  ○ Built confidence and trust<br>  ○ Centralized decontamination processes | • Burnout<br>  ○ Expectations of donning/doffing every time<br>  ○ Is the PPE practical for the work environment<br>• Quality of PPE available<br>  ○ Not designed for the job being used in<br>  ○ Failed fit tests | • Instant boost in morale or instant distrust<br>• Showed deficiency in training<br>• Identification of task-specific risks |

The results were, again, reassessed and coded using the 4iFACT and SEM to reveal actionable communication practices. Specifically, in both phases, the 4iFACT was used to help classify and group participant feedback into communication practices that were perceived to be effective at the individual, interpersonal, community, and societal levels (Sundelson et al., 2023). Within each communication strategy offered, researchers identified perceived strengths and weaknesses of participants' approaches or feedback; ascertain actionable strategies to improve messaging; and gaps in PPE communication, specifically. Further, employing the SEM helped researchers understand how communication did or could function at these four levels (e.g., individual, interpersonal, community, and institutional), and how practices varied across levels. This dual model approach supported a more comprehensive analysis of how communication may support workers during PHTs.

There are many additional verification strategies that can be used to ensure saturation beyond redundancy of information. In this study, researchers employed an iterative coding process that involved constant comparison to support an expansion of codes while incorporating negative case analysis across both phases of data to ensure codes were supported. This comprehensive analysis approach allowed a holistic understanding of communication strategies that were perceived effective and how they could be deployed in the field.

## Results

Results elucidated leadership communication practices within the SEM while considering intersections of the individual [worker] with interpersonal, community, and institutional levels.

### Leadership Communication Practices

Leadership communication practices and initiatives to support employees focused on proactive behaviors to procure necessary PPE and disseminate information as it was received. Participants noted one-on-one communication with employees was important to foster connectedness, expressing that supportive leaders were able to delineate between what employees needed to know and wanted to know.

Even though not everyone had specific or direct experiences with poor leadership practices, some felt there was a disconnect between frontline employees and management during the PHT. Others pointed out that the expectations of management during this time were nearly impossible to meet. It was common for participants to express personal or observed stress of employees due to shifting messages they implemented or received. For example, one participant said, "It felt like we were standing on shifting sand" (Discussion 2, Participant 2) while another said, "There was a lot of uncertainty developed and to no one's fault, we couldn't keep up" (Interview 4). Despite ongoing challenges, participants shared the ways in which information was communicated and how information sources were perceived (see Table 3).

Participants provided interpersonal communication practices that they perceived to be useful (e.g., virtual meetings and town halls) to intentionally "overcommunicate." Although overcommunicating from a transparency perspective was important, participants also referenced the need for brief, clear, digestible, and repeatable information to encourage accountability. As one participant shared, "The chief owned mistakes and was transparent. Transparency can be the biggest strength and weakness. A mission needs to be shared by leadership. The chief made it loud and verbal if he made a mistake and how he was trying to make it better" (Interview 1). This sentiment was also emphasized in Phase 2 of the data collection, with one participant indicating that employees appreciated being told by leadership "we don't know" rather than sharing inaccurate information (Discussion 5, Participant 2).

Table 3. Examples of Communication Practices at Each Level of the 4i FACT Framework, and Actionable Strategies Where These Practices Fit Within or Across Intervention Points of the SEM

| SEM level | Communication practice approaches and information sources at different levels of the 4i Fact Framework | Actionable strategies for implementing 4iFACT strategies based on SEM levels |
|---|---|---|
| Individual | • Living documents that were updated in real time and accessible to all employees<br>• All communications noting clear expectations and the intentions behind those expectations<br>• Use of virtual platforms to disseminate information quickly to alleviate uncertainty | • Use cloud-based systems or hubs (e.g., SharePoint, Microsoft Teams) to store and centralize communication<br>• Implement notification systems such as app alerts to update employees<br>• Use plain language and visual aids to support all literacy levels<br>• Develop standardized templates for communication (e.g., infographics)<br>• Use pre-recorded video briefings to supplement written communication |
| Interpersonal | • Holding daily one-on-one meetings to foster connectedness<br>• Using influential leaders and trainers—both technical and emotional—to support worker safety adherence and sense of wellbeing<br>• Modeling desired behaviors to the workforce | • Provide training and leadership coaching for managers to conduct short meetings that include emotional support<br>• Identify respected figures to serve as mentors; establish mentorship program<br>• Create recognition programs to encourage accountability |
| Community | • Crowdsourcing for information using associations, working groups, etc.<br>• Using training models that rely on coworker and bystander support in donning/doffing practices<br>• Building a network of trusted individuals, groups, and associations to support message development (e.g., NIOSH *Impact Wellbeing*™) | • Develop and use online forums to gather input from partners<br>• Establish rotating cross-departmental task forces to review and integrate feedback<br>• Use buddy systems to improve and reinforce proper PPE practices<br>• Share vetted resources<br>• Cobrand resources with partners |
| Institutional/Societal | • Identifying and mitigating system failures through voluntary reporting systems and updates in the workplace<br>• Ensuring access to easy-to-understand information, training, and resources<br>• Linking to policies and showing how they are being followed<br>• Checking consistency of information shared | • Implement anonymous feedback/reporting programs<br>• Offer various types of training materials to match learning preferences<br>• Audit and align institutional messaging with workplaces procedures |

To support on-site employees, participants perceived one-on-one communication to be the most effective although written sources were also discussed. Participants relied on living documents that could be updated and seen in real time to respond to the fluidity of information. Even though information often changed, equal access to information was observed to support employee morale. Another information source entailed using trusted individuals such as a lead nurse or medical doctor to share health-related messages, who was often leveraged for PPE-specific communication.

Most participants were members of medical, healthcare, or EMS associations that maintained weekly (online) leadership meetings during the COVID-19 pandemic. They shared the concept and leveraging of crowdsourcing as a community resource to improve the quality of information they could share with employees. One participant shared that, as a leader of a state

EMS association, he used his contacts to set up additional calls with no specific agenda indicating, "We got on and commiserated, but then shared best practices in real time. Instead of having silos we would crowdsource and then leadership would pass down this information to their membership" (Interview 4).

Some participants reflected that employees were apprehensive about reporting errors. Rather than a punitive approach, numerous participants explained the importance of finding where the system had failed them [the employee]. One participant emphasized to employees, "You will not be fired for a clinical mistake, rather we have to identify the systems issues" (Discussion 3, Participant 3). The group highlighted the importance of joint trainings to minimize an "us versus them" mentality. Also aligned with system failures at an institutional level, participants acknowledged the gap in information and resources provided across varying facilities in rural and urban areas, noting the value of consistency in practices and procedures across their locations.

## PPE Leadership Communication Practices

The other overarching theme encompassed topics around the knowledge, attitudes, perceptions, and communication pertaining to the availability and use of PPE. Participants were unanimously concerned about having enough PPE, most often NIOSH Approved® respirators. One participant said, "Will we have enough PPE? That was the big question. There were times we were skin to teeth and very close to the edge. Then there was an issue where people were asking 'is this PPE really going to protect us?'" (Interview 2).

Participants who were at organizations that ran out of PPE candidly described their experiences. One said, "My agency ran out of PPE. The first time I came close to an anxiety attack on the job was in 2020 when I was putting on PPE that was different. We should not be putting on PPE that is different/new for the first time during a pandemic" (Interview 3). There were also questions around the ability to effectively decontaminate and reuse disposable respirators when conservation strategies were in practice. In some cases, participants felt that their own uncertainty around decontamination and reuse elicited more uncertainty among employees.

Participants emphasized the need to be transparent about PPE availability. During shortages, messaging that focused on the quality of PPE [if applicable] was perceived by participants to help ease uncertainty. For example, one participant noted, "Even if we didn't always have enough, people wanted to know if the PPE was the latest and greatest and that seemed to help [reduce stress]" (Discussion 3, Participant 1). Further, participants noted that various job roles were temporarily reassigned to decontaminate PPE. These actions were perceived to improve a felt sense of safety in the workplace because it was a visible action that showed care for employees' health.

Noted earlier, identifying trusted messengers for PPE-related information was considered helpful. As one participant said, "You must have someone who is a medical resource who is trusted, who is valued . . . We have continued that moving forward with the medical director—you can't put a price on that, it's been essential" (Interview 2). The value of managers or leaders modeling desired health-protective behaviors was referenced, such as responding to calls in a full PPE ensemble (i.e., "walking the talk") to visualize support for guidelines. This sentiment was illustrated when one participant said, "If I showed up in the full ensemble people knew we (leaders) meant business, and they would go put on their gear" (Interview 4).

Although less common, for participants whose organization did not experience PPE shortages, they observed how the frequency and duration of PPE use contributed to employee stress levels. As one participant said, "We had it [PPE] but also, the sheer volume of donning/doffing led to burnout" (Interview 1). Participants also explained that some employees felt their PPE did not offer enough protection. For example, one participant indicated that even though they were able to secure respiratory protection, "It had a 40% fail on fit testing and those quality issues caused visible stress among employees" (Interview 2). Conversely, availability of PPE that was perceived to be of higher quality was discussed as having a positive impact on employees.

Participants expressed difficulty responding to external PPE information that some employees brought to the workplace. Although difficult to engage in conversations around outside messages or sources, participants identified a few training mechanisms that helped create a shared understanding around this topic. One discussion focused on the emergency response during other PHTs, explaining the need to mirror previous efforts. For example, one participant said previously, teams were mobilized and trained up to the level of competency needed to don and doff PPE. Rather than focusing on leadership modeling, participants explained the benefits of coworker modeling and support. One participant said, "We reinforced to the team that there cannot be any weak links. It helps to see other people's competence—you need to see other people don and doff correctly and pay attention to those measures" (Discussion 2, Participant 2). There was an emphasis on the need to build up this organizational model in the future.

There were some notable themes and examples shared at the outermost level of the SEM. Much of this feedback was related to consistent access and resources across job roles, organizations, and work settings. For example, access to fit testing was consistently referenced, with participants noting that the home health community did not have the same knowledge related to respirators as other healthcare entities, reducing their ability to obtain adequate respiratory protection. Home healthcare employees are not included in RPPs; so, as one participant explained, "Fit testing is stressful when doing it at the trunk of a car and what message does that send to these workers?" (Discussion 2, Participant 1).

Other participants elaborated on policies and practices related to accessible PPE protection, indicating that the communities they served and location was relative to PPE

access (quality and quantity). One participant explained, "We went from having a 2-week stockpile to on-demand ordering instantly. We didn't even have a backup box . . . If the organization is not hospital-based, and if they are in a rural area, their resources are very different" (Interview 3).

These topics took on even more significance when they referenced rural communities, as participants said remote locations never knew what PPE they were going to receive, were concerned it was going to be counterfeit, and did not have access to in-house fit testing. Table 3 summarizes some of these communication levels at each level of the 4iFACT framework discussed throughout this section. Actionable strategies for these practices, relative to the SEM, are also included in Table 3 and discussed in more detail next.

## Discussion

Integrating resources to help employees make reliable on-the-spot decisions during an emergency is challenging (Thürmer et al., 2020). Specific to PPE-related information, researchers argue that organizational systems need additional support to interpret, analyze, and disseminate information to their workforce (Figueroa et al., 2023). We sought to identify communication practices used by healthcare and EMS managers throughout the COVID-19 pandemic and the perceived impact these practices had on employee knowledge, attitudes, and behaviors. Analyses allowed the emergence of first, patterns around leadership communication practices and second, patterns in leadership communication practices related to PPE. First the discussion focuses on tangible takeaways that were reinforced during Phase 2 of data collection to provide ideas for improving future information at the individual, interpersonal, and institutional levels.

### Trusted Messengers and Messages

First, saturated feedback around the importance of trusted communicators was an important takeaway. The desire for consistent messaging from trusted individuals was reiterated during Phase 2 discussions. Moving forward, it may behoove management to determine what frontline employees need to know from a trusted source. Participants mentioned that fit testing completed by trusted persons would have been more effective in aiding buy-in around the protective capability of respirators. Therefore, also considering the perceived trustworthiness of the trainer or communicator may improve respirator implementation and use.

Participants in the current study expressed that using a reputable third party or building up a larger institution as a trusted source should be consulted during an emergency (Discussion 5, 6). Another study found that trust and influence can be transferred by association to a secondary messenger who is connected to the primary trusted source (Shen et al., 2023), whereas others have argued the importance of healthcare systems building partnerships with communities to engage and train individuals to serve as trusted messengers that support health-protective behaviors (Chau et al., 2023; Korin et al., 2022; Wu et al., 2022).

However, even if trusted messengers are identified, more attention is needed regarding the different ways that messages are crafted and disseminated. Current results indicate that it was more common to share only what employees needed to know specific to their job to avoid information overload. Employees are more likely to understand communication from management if the messages are distinctive based on situations, groups, and shifts (Sanders et al., 2020; Wang et al., 2020). Individuals benefit from hearing health-related information multiple times and in ways that align with their cultural fluencies and competencies (Figueroa et al., 2023; Shen et al., 2023). Specific to PPE, using up to seven different modalities (e.g., flyers, fact sheets, QR codes, etc.) to communicate messages about respirators has been well received by HCP (Hines et al., 2022).

### Accurate PPE Information

Creating a shared understanding about the effectiveness of PPE is important. After trusted messengers and ways to disseminate messages are identified, the creation of that shared understanding at the interpersonal level may be easier. Participants expressed that, in some cases, sharing examples of false information helped prompt more accurate conversations around different types of respirators. As an example, the National Institute for Occupational Safety and Health (NIOSH) consistently develops and updates infographics about PPE. Recent infographics have shown characteristics of a counterfeit respirator that is not approved by NIOSH (2023). Seeing a graphic example of a respirator falsely claiming adequate protection was discussed among participants as one way to empower workers in their future respirator selection.

Similarly, presenting various respirators and their appropriate applications based on job tasks was a referenced among participants as a method to debunk false information and improve trust in the efficacy of respiratory protection. A similar recommendation was made by a healthcare advisory panel, indicating that alternative respiratory selection and use criteria could be more clearly communicated during surge demands in respirators (Figueroa et al., 2023). Discussion 5 participants noted that decontamination and storage information should be integrated into RPPs that show both the "wrong" and "right" way to complete these tasks.

### Accountability and Empathy

Employees' perceptions of their management's intention to be transparent is positively related to organizational commitment, engagement, and productivity (Wang et al., 2020). This same notion was expressed by current participants with accountability being observed and described at the organizational, leadership, and individual levels. Management's accountability to participate in guidance and requirements was

important. For participants, management visibly following the same guidelines and the "we're all in it together" mentality supported "our mental health, keeping it in-tact" (Discussion 5, Participant 2). One example of this included creating job tasks responsible for PPE decontamination as a visible action prioritizing worker health. This practice aligns with previous research showing that small job changes during a crisis can support employee resilience by helping the organization, work crew, and individual employee recover quicker (Demerouti & Bakker, 2023; Sarkar & Clegg, 2021).

Participants also discussed enacting leadership through questions, decisions, actions, and interactions (i.e., empathy as a communication practice). Empathy is a skill needed to build trust in the workplace by listening to the viewpoints of others and fostering a shared understanding (Shen et al., 2023). This practice was prevalent with participants observing elevated stress levels among their employees for not having enough PPE. These participants referenced PPE as "psychological body armor" for their employees. However, it may take practice for managers to empathize and understand perspectives across different job roles. Better compassion and empathy training among those in health management roles has also been shown to be useful (Wittenberg et al., 2021).

## Communication Literacy

Commitment to accessible communication during emergencies must be considered to accommodate all workers, including HCP and emergency responders (Berger et al., 2020). Current results support these points as participants observed varying protections for employees who served different regions and locations and the need for adaptable processes and flexible messaging to meet the needs of all workers.

When participants perceived or observed communication barriers around health literacy, they used one-on-one communication to support relevance and clarity. Some of these literacy challenges occurred when communicating or working with those who had differing opinions around respiratory protection. This challenge was more prevalent at large healthcare systems that had locations in rural and urban facilities. Similar trends emerged at the organizational level, indicating that the dissemination of messages and response plans can be improved. For example, NIOSH (2024) developed an *Impact Wellbeing*™ campaign that, although not specific to PPE, offers evidence-informed solutions to sustain worker wellbeing among healthcare workers. Champion practices outlined in this campaign include communicating and customizing materials to show organizational commitment to worker wellbeing and finding ways to integrate wellbeing into quality improvement efforts to demonstrate the business case for these activities (NIOSH, 2024).

## Theory-Guided Messaging

The 4i FACT and SEM were applied in this study as two complementary models that can provide a structured framework for identifying and analyzing communication strategies on a broader level and then more specifically, to guide message development and dissemination. First, organizations may consider how to intervene at different levels of the SEM during PHTs. The SEM acknowledges the interactive nature of factors and practices across these levels as individuals engage in multiple environments including work, home, and their communities (Stokols, 1996). In this study, analyzing leadership communication practices within each SEM level helped identify how communication, functioned within an broader organizational system. In the current study, employers' acknowledgment of this spillover encouraged the development of workplace committees and employee assistance programs to provide support to employees and their families in the form of meal deliveries and free counseling. Moving forward, using a systems framework such as the SEM to direct attention to various intervention levels may help identify and facilitate changes necessary to support individual' long-term health and participation in health programs and activities (Frank, 2024).

While the SEM identified communication opportunities at a broader systems level, the 4iFACT model was used to organize communication practices among participating managers, making it easier to identify effective strategies to engage with and support employees. Moving forward, grouping communication practices using this model could ascertain what and how specific communication practices may contribute to other aspects of employee health including overall wellbeing and resilience during PHTs. The use of these models in tandem was useful to identify gaps in communication practices at various organizational levels and mediums, identifying how to improve future engagement and PPE-specific messaging. Their coordinated use also provided a foundation for future mixed-methods research to validate findings and improve health communication planning.

Although these two frameworks showed utility, other frameworks can be consulted and adapted to improve communication practices. For example, the Simple, Accountable, Accessible, Repeatable, and Actionable (SAARA) framework helps distill information into what is needed to know; designates primary points of contact to deliver accurate statements; seeks to use a variety of communication methods to support diverse ways of information consumption; and provides relevant, timely information (Figueroa et al., 2023).

## Limitations

Study limitations must be considered when interpreting the results. The convenience sample is small Findings cannot be generalized to healthcare and EMS industries or other industries that were experiencing PPE challenges during the COVID-19 pandemic. Also, there were limits to the job roles of participants recruited, which is one reason snowball sampling was added as a recruitment method, possibly eliciting selection bias and an uneven sample (Parker et al., 2019). Certain groups were overrepresented in the study. Specifically, although some participants managed volunteer EMS/first responders, no

participants were volunteers, which may have elicited different results.

Although the researchers asked participants in management roles the communication practices they employed and then the perceived impact these practices had on their frontline employees, researchers were unable to directly engage with frontline employees to confirm accuracy of the perceptions. Considering the feedback aligns with previous studies referenced in this paper, the authors believe the data collected, albeit from a homogenous sample, was broad enough to summarize important communication practices to consider.

## Conclusion

Pandemic preparedness has become a feature of healthcare system planning to support worker wellbeing and resilience (Pollock et al., 2020). The identification of effective communication strategies that resonate across cultural contexts while providing social and emotional support is needed (Sahay & Dwyer, 2021; Van Bavel et al., 2020). A gap exists in the development and dissemination of communication practices to support employees during times of uncertainty.

Identification of how various communication models can be used to develop and distribute a targeted health communication plan embedded in standard operating procedures may be needed. Input from frontline employees can be sought in future research to confirm that communication practices identified in this study can be useful. Engaging frontline employees could uncover additional motivations or barriers that influence the use of PPE or reveal other ways to support employees during PHTs. Such future research may be accomplished using a mixed-methods approach that can aid the triangulation of frontline and management data to enhance validity and improved communication practices.

## Author Contributions

Emily J. Haas: conceptualization, research design, data collection and analysis, theoretical framework, writing. Stephanie L. Orstad: interrater reliabilidata analysis, theoretical framework, review, and editing.

## Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## Ethical Approval

Our study was reviewed and deemed exempt human subjects research by the CDC National Institute Occupational Safety and Health Human Research Protections Board (exemption no. 21-NIOSH-08) per 45 CFR part 46.104. All participants gave informed consent to participate in this research.

## Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

## Attribution Statement

NIOSH Approved is a certification mark of the U.S. Department of Health and Human Services (HHS) registered in the United States and several international jurisdictions.

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