Identifying leadership practices to support the uptake of reusable elastomeric half mask respirators in health delivery settings

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Abstract

An increase in reusable elastomeric half mask respirators among healthcare personnel has been documented during pandemic emergencies; however, research has not detailed leadership practices to support their use. Forty-three organizations implemented EHMRs received from the United States federal government which prompted interviews with 73 individuals who managed respirator distribution and fit testing between October 2021 and November 2022. Interview data was qualitatively analyzed. Themes around organizational culture and leadership practices emerged when discussing how elastomeric half mask respirators were integrated into health delivery settings including communication and outreach methods to aid worker support. Example included on-line and hands-on training, peer support, leadership support, and a culture that supports respirator use. To support a shift to reusable respiratory protection being procured and implemented, organizational- and individual-level perspectives are needed. Employee engagement, respirator champions, and updated verbal and written communication mechanisms are important takeaways for leaders to consider during any routine or emergency scenario.

Introduction

The integration of reusable respirators, such as Elastomeric Half Mask Respirators (EHMRs), has been touted as a solution to mitigate supply chain shortages, excess cost, and space needed to stockpile the disposable Filtering Facepiece Respirators (FFRs).[1–4] In 2020, the Centers for Disease Control and Prevention (CDC) reiterated EHMRs as a practical alternative to disposable FFRs during surge demands and as a routine strategy.[5] EHMRs have a durable rubber or silicone facepiece that can be cleaned/disinfected between patient

care for reuse. Previous studies have shared experiences piloting EHMRs in healthcare[6,7] and public safety[8,9] settings (i.e., health delivery settings).

Although studies have captured individual perceptions, experiences, and ultimately support of EHMRs among Healthcare Personnel (HCP),[10] such data has not been captured at an organizational level to ascertain leadership practices that can support the integration of these reusable respirators. This study investigated the experiences of 73 professionals who distributed EHMRs to their employees across 43 health delivery settings. The purpose of this paper was to qualitatively analyze the iterative data to identify consensus among respondents and discuss broad leadership practices that emerged in supporting workers' respiratory protection requirements and resources.

Method

Researchers used a convenience sample of hospitals, dental clinics, long-term care facilities, ambulatory units, and fire/police departments that received EHMRs from the United States Strategic National Stockpile (SNS) during the COVID-19 pandemic to gather longitudinal experiences and strategies throughout their respective EHMR deployments. This activity was reviewed by the CDC and was conducted consistent with applicable Federal laws and CDC policy.[1] After organizations received EHMRs from the SNS and the Institutional Review Board (IRB) deemed the study exempt, organizational Points of Contact (POC) who were managing and leading the distribution of respirators were contacted by NIOSH to gauge interest in voluntarily providing feedback. Of the 49 organizations that received EHMRs, 43 volunteered to participate across 16 in the United States.

This study leaned on the Delphi technique, a commonly used and accepted method to achieve consensus from subject matter experts on a real-world topic.[11] This technique is designed as a group communication effort, using a series of questions to collect and discuss data on a specific issue over time.[12,13] One of the first uses of the Delphi technique in healthcare occurred in Canada[14] and focused on nurse education. To date, studies have occurred internationally, focusing on the responsibilities of healthcare leaders in various roles, providing strategies and competency frameworks in healthcare education.[15] The Delphi technique promotes the iterative sharing of feedback and practices to not only allow but also encourage respondents to reassess their initial opinions based on the experiences of others.[16]

Examples questions used during each separate interview discussion are shown in Table 1. Although the specific discussions and information sharing of others is not provided in the table to maintain organization anonymity, the sample questions provided at each time point illustrate how the topics were building on each other over time. Specific to this study, one advantage of the Delphi technique is that it provided anonymity to respondents, which helped prevent apprehension around sharing site-specific information during the COVID-19 pandemic as well as reduced the likelihood of potential biases in establishing consensus-based opinions (e.g., a large hospital system may be perceived as more dominant

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[1.]See eg, 45 C.F.R. part 46; 21 C.F.R. part 56; 42 U.S.C. §241(d), 5 U.S.C. §552a, 44 U.S.C. §3501 et seq.

and preferred, or respondents might prefer to adopt the processes or procedures outlined by an organization that is comparable to their own).

Data collection

Interviews probed organizational and leadership practices used to support worker needs regarding respiratory protection. Several interactions and iterations are expected during the Delphi technique to identify policy needs or better predict and respond to future events. Specifically, research has indicated that three iterations are often sufficient to collect information and reach consensus.[11,17] Consequently, researchers developed three semi-structured interview guides that built on questions and responses from the previous interviews to enable a consensus-based approach. Literature reviews about EHMR implementation and maintenance, employee perceptions and reactions to EHMRs, implementation and communication about EHMRs, and questions about the organization's culture toward respirators in general informed the interview guides.[18–20] POCs were presented with similar questions during follow-up interviews such as information that was useful for their organization, changes made to protocols, and then discussed what other organizations who were participating in the project found useful (anonymously). This series of interviews allowed researchers to reflect on others' previous experiences, allowing POCs to reflect and determine what was useful and challenging for advancing EHMRs in their Respiratory Protection Program (RPP).[11]

Organizational POCs voluntarily participated in virtual interviews between October 2021 and November 2022—once before or concurrent to EHMR distribution and then again in 3–4-month increments. Before each interview, researchers e-mailed and reviewed an informed consent document that outlined the purpose and voluntary nature of the study. The virtual meetings were not recorded to maintain confidentiality. One researcher facilitated the discussion while another took notes, numerically coding each file.

Sample

Participating organizations spanned 16 states and included 17 healthcare and 26 public safety settings. Researchers interviewed 73 unique individuals who identified as a POC for their organization. Interviews ranged from 20 to 65 minutes with an average time of 37 minutes. All organizations had POCs who participated in at least one interview and 65.8% of the sample had POCs who participated in two or three interviews. Table 2 shows a breakdown of POCs' job roles.

Typically, data saturation informs the sample size because recruitment ends when redundancy in feedback occurs.[21] Even though saturation was prevalent after the first round of interviews, the Delphi technique facilitated follow-up interviews to understand how initial barriers were overcome from a leadership perspective (if applicable), share how other leaders were overcoming these barriers, and provide lessons learnt to inform a consensus of practices around future respirator programming.[11] The second and in some cases, third interviews allowed POCs to formulate consensus opinions about best practices in leadership over a respiratory protection program.

Analysis

Using NVivo software[22] two researchers met to collaboratively discuss and code the data using deductive and inductive approaches offered by several scholars.[21,23,24] These steps included initial coding, focused coding, constant comparison, and negative case analysis. The codebook was finalized during the constant comparison and negative case analysis and transferred from NVivo to a Word document to ascertain the interview excerpts supporting each code more clearly. Researchers used the codebook to observe connections across participating organizations.

Results

Several themes emerged around organizational and leadership practices relative to respiratory protection needs among employees. Patterns also arose around perceived employee stress, accountability, and the role of managers and peers in perceived employee well-being. POCs discussed individual- and organizational-level factors that they perceived to influence the use of disposable and reusable respirators. POCs reflected on ways they could modify their leadership practices to support EHMR adoption to also support their employees on the job. These leadership practices are outlined below.

Encouraging user accountability

First, employee accountability for a reusable EHMR, including cleaning and proper storage, was often referenced. One POC for a long-term care facility explained:

> "I see them wearing it [EHMRs] but we don't know if they are disinfecting. We gave them the supplies and trained them, but we never know if it is happening"

> (Organization 54).

Five of the organizations established a central location where employees could drop off their EHMR to be cleaned, disinfected, and stored during off shifts. However, due to lack of participation, four of them eventually suspended this service and employees became responsible for disinfecting their respirator. POCs reported employee dissatisfaction with being responsible for [another] piece of equipment. A POC within the emergency trauma unit of a participating hospital summarized these accountability barriers stating:

> "Now that they can step out and toss a mask in the garbage, it makes the EHMR not as attractive because there is maintenance. Another struggle is they have to remember to bring it with them on their shift. If they forget it, they grab what is readily available and it [EHMR] gets stepped back in the memory bank"

> (Organization 47).

Although initial buy-in was difficult at some organizations, many POCs observed an increased sense of employee ownership and personal responsibility throughout the 1-year demonstration. One EMS ambulatory department stated:

> "At first it was the biggest complaint. Many people didn't want to be responsible for it but on the flip side, eventually took pride in taking care of it as their own"

> (Organization 23).

In summary, even if EHMRs were not the norm as supply chains stabilized, POCs observed that employee maintenance of the respirators improved, noting a positive impact on the overall culture.

Amplifying peer support

Feedback was shared regarding the role of peers in encouraging respirator use. To illustrate, one POC expressed that at first, fire-based paramedics kept the EHMRs on their belt but rarely donned them. However, during the second interview the same POC stated:

> "I noticed that it just takes one person to do it [wear the EHMR]. Once one person does it you see other people following and then others. I think people don't like looking funny, or how big they are. But if everyone is wearing them it's normal"
>
> (Organization 34).

Similar feedback was shared from a long-term care setting, with the POC stating:

> "It has been received better than I thought it would be. What's helped is we have had certain staff/coworkers be cheerleaders by going around and saying how great it is"
>
> (Organization 54).

Ensuring organizational support at various levels

Several POCs noted challenges related to organizational buy-in and support at higher levels of their company. Some noted that their scheduled fit test training kept getting pushed back. Specifically, for participating organizations that were coordinating this program with several satellite locations, implementation took longer than they thought it would. One POC stated:

> "Our turnout at first was poor due to staffing and other challenges at some of the places. It was the culture at some places and the culture was different everywhere - for some everyone loved it, and some were challenging EHMRs so we knew we had to send the right message and get people to appreciate what the respirators were going to offer"
>
> (Organization 71).

Challenges were also encountered when trying to partner with other organizational units. For example, a hospital trying to partner and expand the EHMR program with their local EMS or trauma unit sometimes faced resistance. To this end, holistic buy-in from all organizational units was regarded as important to many POCs. One POC said:

> "I got a lot of push back from our EMS leadership. You need leadership support, and the EMS providers were not on board with this. They need to better understand the role of this type of facepiece"
>
> (Organization 36).

Some POCs expressed that they had been trying to make the case for EHMRs for years and receiving EHMRs from the SNS, in combination with pandemic-related supply shortages, was the only way to garner support at a higher level. Alternatively, some POCs

described weekly, in-house education programs that provided EHMR training, noting the programmatic changes supported by the organization.

Ongoing supervisor support

Points of contacts regularly said that leadership communication and engagement fostered more perceived trust and participation in the program. POCs indicated that trust was earned, in part, by modelling the behaviours they were promoting. As one POC stated:

> "We have supervisors on each call that oversees or corrects someone. It is important for management to lead by example. So, if you want them to wear one [an EHMR], we have to wear one too"
>
> (Organization 22).

Alternatively, it was important for the POCs involved to have trust in the individuals who were helping with the program, noting the important roles of those who did the scheduling, rescheduling, and fit testing.

Various forms of communication about EHMRs were often referenced as critical to program success. However, communication was also referenced as a pathway to improve trust and the overall culture of the organization. One POC reflected that their program was going well because of the holistic approach to tie EHMRs into overall health and safety programming, stating:

> You can't just sit it on their desk and tell them to use it … You must involve them in its initial function and use so they are likely to use it without me there"
>
> (Organization 38).

Another POC reflected on the success of their program, noting they had a new, proactive chief who wanted to make a lot of changes that would help EHMRs be more sustainable going forward.

Similarly, some POCs reflected that prominent leaders who were considered subject matter experts were imperative in promoting EHMRs. For example, one POC discussed that their training chief brought up EHMRs every few weeks and that, the more they talked about it, the more their employees talked about what the best uses of it were for them on the job. Similarly, another POC explained that their county medical director, who writes all the protocols, provided several informational meetings and webinars to employees about the purpose and protective utility of EHMRs. The POC observed this messenger as highly trusted among employees, which enhanced EHMR use at their department.

Discussion

Although this study used a sample of 43 organizations across 16 states, data from this United States Delphi study can be used to extrapolate implications for leadership in Canada's healthcare sector. Specifically, previous healthcare studies in Canada have argued that existing guidelines and frameworks are necessary to help healthcare workers meet demands of the healthcare system.[25,26] Specifically, organizational guidelines and frameworks that

can be used by leadership to improve adherence to respirator programs are necessary to support worker health and safety.[27] Historically, organizational leadership support and communication are more difficult to incorporate as metrics in healthcare. This study expands leadership in health systems by recognizing the importance of guidelines and frameworks for organizations to reference when new respirators or other PPE are being introduced to workers. Interviews with 73 individuals representing 43 organizations focused on some of these less tangible leadership practices and their implications in supporting organizational RPPs and workers' respiratory protection practices.

Changes in the culture and communication toward respirators

There has been a growing interest in the contribution of leadership practices to improve challenges in healthcare, with special emphasis in the Canadian health sector.[25,26] Within the Canadian health system, leadership has been cited as lacking during the implementation of major system reforms,[28] which occurred at the onset of the COVID-19 pandemic. To this end, arguments for collaborative engagement during the implementation of any procedural changes have been referenced as useful to the overall culture.[29]

This study supported the concept of collaborative engagement with employees as many POCs correlated an increase in EHMR receptiveness and use with a positive change in their organizational culture. Collective experiences from POCs emphasized the value in peer support, employee engagement around EHMRs, and organizational flexibility to support worker well-being. For example, as other employees had positive or status quo experiences with EHMRs, POCs observed others using and requesting them, with some witnessing EHMRs becoming the preferred respirator type by the end of the demonstration period. The positive role of respirator champions has been observed and recommended in other documents,[3,4] so it is not surprising to hear the role of peer support in this study as well.

Engaging employees in EHMR selection, training, use, and maintenance is also important to sustain organizations' inclusion of 'new to them' respirators. Along with a cultural shift toward reusable respirators, POCs discussed the importance of holistically supporting employees' well-being and noted that this [EHMR distribution] program was a step in the right direction. Other research within this project found that the distribution of EHMRs was associated with higher perceptions of perceived safety climate,[30] indicating that organizations can consider what role or roles respirators have in employee well-being and perceptions of their organization's safety culture.

Results also showed the importance of including realistic expectations and uses of EHMRs into dissemination plans. POCs noted the importance of openly communicating potential drawbacks that employees may experience (e.g., breathing resistance or moisture buildup) so they knew what to expect. Along these lines, the current study results have implications for improving policies and programs around respiratory protection. For example, in the United States, a mandated RPP is required but only includes technical information around respirator selection, use, and maintenance. These results support the need to also include aspects around leadership communication as it pertains to respirator use and support during routine and emergency scenarios. Other research has also noted the importance of policies that are flexible, adaptable, and resilient to uncertainties - all of which occurred

during the COVID-19 pandemic, requiring leaders in health settings to support and model respirator use.[30] This same research has linked improvement in the availability of respirators, respirator training, and leadership practices with improvement safety climate, further supporting the need for effective leadership practices when introducing something new to the workforce.

Last, the way in which EHMRs are presented to employees and their purpose will likely need to evolve to support use. Several participating organizations eventually moved away from framing EHMRs as an emergency backup and started framing them as "PPE of the future." To this end, future research should explore types of messaging around reusable respirators that can normalize use and the role that leaders can have in this process.

Limitations

This study has limitations starting with the convenience sample of individuals that cannot be generalized to respective health delivery settings or other industries that were experiencing supply chain shortages during the COVID-19 pandemic. Further, the results cannot be generalized to Canadian healthcare settings given the US-based sample. Relatedly, because of a myriad of contextual factors, what works for some organizations may not work for others. Further, limitations of the Delphi technique specific to various healthcare settings include a potential lack of accountability due to the anonymity provided.[31] Although criticism to the scientific rigour of the technique has emerged over the years, when it comes to using the Delphi approach in qualitative studies, the process has been deemed thoroughly scientific.[32] Regardless, the judgement on consensus being reached in some qualitative Delphi studies will always be more subjective on the part of the researcher, and therefore potentially open to bias[11] and must be considered with these results. Even though the data were subjective observations from the POCs, the results produced saturated feedback and eventually, a consensus of experiences among the organizations across different organizational types.

Elastomeric half mask respirator research has focused on the perceptions and experiences of individual users[10,33] whereas experiences at the organizational level have not been studied. This perspective was necessary to identify leadership practices that can support other forms of respiratory protection during routine and emergency operations. Interviews helped recognize lesser-known areas of inquiry and in this case, were necessary to understand experiences, barriers, and perspectives over time.

Conclusions

This American study has leadership implications that can be considered by international healthcare entities. Specifically, the Canadian healthcare sector has been regarded as resistant to change, with a lack of leadership action.[34] This study illustrated tangible and intangible considerations for organizational leadership who are trying to support the integration of "new to them" respirators through consistent education, support, and communication. POCs were able to identify areas that can be proactively addressed whether that includes drafting respirator implementation plans or deploying practices and policies to better engage and communicate with employees about respiratory protection.

These findings complement previous recommendations to improve preparedness measures across organizations that rely on respirators to protect health workers. However, given that data collection reached a high level of saturation (ie, redundancy in feedback with little new information being shared among organizations) during each respective time—first, second, and third—across a range of occupations in healthcare and emergency response, there is an even bigger need to develop and support programs that allow for emergent and routine uses of EHMRs in the workplace. This study showed empirically driven leadership practices that can support these emergent and routine EHMR uses to protect workers.

Funding

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Table 1.

Example questions asked of organizational points of contact throughout the EHMR demonstration study. Question topics built on each other over time.[a]

Example time 1 questions	Example time 2 questions	Example time 3 questions
Discuss some benefits you anticipate by your employees using EHMRs in the workplace.	If applicable, describe some of the positive feedback you have heard from employees about EHMRs.	Discuss any benefits identified by your organization/employees to using EHMRs that should be used by other organizations.
Discuss any challenges you anticipate with implementing EHMRs in the workplace.	Describe any ongoing challenges that have occurred with using EHMRs.	How did you or your organizational management address ongoing challenges regarding the use of EHMRs that may help others?
Who is responsible for monitoring employees' adherent use of EHMRs?	What process have they (the person responsible for overseeing EHMR use) been using to monitor the program?	Explain the process that employees use to monitor the EHMR program – including overcoming adherent use.
There are many aspects of a Respiratory Protection Program (RPP). We are going to discuss some general sections. Provide aspects you think need improved or updated based on 1) incorporating EHMRs and 2) the COVID-19 pandemic.	Knowing that it is still early on in employees' use of EHMRs, what considerations do you have to: • Improve gaps in current RPPs? • Update guidance or instructions on EHMR use? Which considerations are unique to the COVID-19 pandemic?	Reflecting on your current RPP, what changes, if any, were made to your written RPP during the COVID-19 pandemic to account for EHMRs? • [If applicable] What changes do you anticipate permanently remaining in your program?
Thank you for your time today. Previous work contracted by NIOSH has produced general implementation guidelines around fit testing, training (including donning and doffing EHMRs), and other teaching tools. OSHA also has information available. After this call we are going to provide you with these draft guidelines and resources for initial assistance as you think about deploying EHMRs across your organization. We will ask for feedback on their applicability on our next call.	We would like initial feedback on the application of previously provided EHMR implementation guidelines for your organization. • What information is not relevant or missing for you? • What would you change to be more relevant to your employees or tasks? • How might you be able to use it to develop your own trainings?	As we discussed in the opening interview, there is previous work contracted by NIOSH that produced some general implementation guidelines around fit testing, training (including donning and doffing EHMRs), and other teaching tools. OSHA also has information available. We provided these to you for initial assistance. After implementing this PPE for almost 1 year: • What information is not relevant? Is Missing? • If applicable, what did you adapt to be more relevant for your employees or tasks? • How might you be able to use it to develop your own trainings?
How is health information communicated in your organization?	How have processes and procedures related to EHMR use been disseminated and put into practice?	What EHMR dissemination processes and procedures worked best to support workers during the COVID-19 pandemic?
Describe the leadership communication that exists around PPE and respiratory protection in the workplace between managers and workers.	What management practices have worked best at promoting PPE/respiratory protection safety on the job? Impedes the promotion of PPE/respiratory protection?	In what ways did you or your organization encourage the use of respiratory protection [when needed] on the job from which others can benefit?

[a] Organizational feedback and information sharing to help build consensus is not included to maintain anonymity.

Table 2.

Job roles by healthcare and public safety settings.

Participating job roles	Participating POCs in healthcare settings	Participating POCs in public safety settings
Executive leadership (n = 6)	5	1
Vice president, chief operating officer, and chief medical officer		
Director (n = 15)	12	3
Clinical operations, prehospital care, employee health and safety, supply chain management, executive, professional standards, and communication risk reduction/prevention		
Manager (n = 8)	4	4
Employee health, environmental safety, quality assurance, and special programs		
EMS/Risk coordinator (n = 6)	5	1
Risk/Safety coordinator, emergency administrator/planner, and operational readiness specialist		
Industrial hygienist/infection prevention (n = 8)	7	1
Industrial hygienist and infection preventionist		
Support service (n = 6)	4	2
Trainer, fit tester, office support, respirator technician, apparatus engineer, and central disinfection processing		
Fire and police department officer (n = 20)	0	20
Lieutenant, captain, fire marshal, fire chief, and assistant fire chief		
Frontline employee (n = 4)	4	0
Paramedic, nurse, and medical doctor		
Total (n = 73)	41	32