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# Impact of PPE on Verbal and Non-Verbal Communication



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Our ability to communicate to one and another is an essential part of being human. Whether it's socially, in employment or in emergency situations, we need to be able to communicate information in such a way that the person on the receiving end can see, hear and comprehend what is being said. When we are unable to communicate effectively this can lead to feelings of distress, anger and frustration and depending on the environment this is happening in, a lack of comprehension in communication can have detrimental effects.

One industry that is currently in the spotlight, and where communication is essential, is healthcare. In order to protect both healthcare personnel and patients, personal protective equipment (PPE) is being utilized. However, in wearing this to protect people, there are negative impacts being experienced. With the risk of airborne transmission due to COVID-19 this is seeing respirators, safety glasses and face shields being worn all at once by healthcare personal to protect both themselves and the patient. With the mouth being completely covered, safety glasses covering eyebrows, face shields further muffling sound and in addition to the noisy working environments, both patients and employees are experiencing great difficulty when communicating with each other. This white paper will examine the ways in which we communicate, how sound is impacted by PPE and how we can reduce these issues while remaining protected.

## Verbal vs. Non-Verbal Communication

When examining the role of PPE and our ability to communicate, it's important to understand communication itself. In broad terms, this is the act of transferring information from one person or place to another. For humans, when we speak this information transfer can be broken down into two subcategories, verbal and non-verbal communication. Verbal is simply the words we use and non-verbal encompasses everything else that we do when we are conveying our message; such as our tone of voice, rate and volume of speech, how we articulate our words, our facial expressions, eye contact and body language. When comparing the importance of the two in conveying information it is believed that verbal communication equates to around 7%, body language 55% and tone of voice 38%. This makes non-verbal responsible for 93% of the message and therefore absolutely essential in communicating with others.

Our faces are the key way to understand what we are trying to say when we convey a message. For verbal communication this is somewhat calculated and we can think about what we want to say before we say it. However, when it comes to non-verbal communication, our faces give this away as this is a natural reaction and we have less control over how we express this. When we attempt to fake a particular emotion for what we are trying to communicate to be perceived a certain way, this impacts on the other factors like tone of voice and volume which can make it obvious this is not genuine. These expressions are generally universal, with joy, surprise, sadness, anger, disgust, fear and contempt. This is considered to be consistent even across different ages and ethnicities. If we are in a foreign country we are able to recognize happiness, for example, without even engaging in verbal dialogue by seeing someone's smile and their eyelids tightening. Similarly we know if someone is angry through their eyebrows lowering, lips pressing firmly and eyes bulging. This emphasizes that a large proportion of our communication is non-verbal.

It has been found that humans tend to process the face as a whole, as opposed to individual features. When this ability is impeded on, this disrupts this cognitive function. If we are interacting with unfamiliar faces, the mouth and eyes are where we tend to focus our attention to draw an understanding from as these are the most expressive. Our brains subconsciously analyze the movement of these regions to determine information. For those in the healthcare industry, trying to convey a feeling of calmness or happiness is very hard to do when these two key regions are covered by PPE. This can add to the stress and anxiety patients are already feeling, making treatment harder.

When non-verbal factors such as facial expression, tone of voice, articulation and volume of speech are interfered with we then become reliant on the words being spoken to interpret the message, as opposed to the way it is expressed. Right now this is something we are experiencing with the increased use of respirator masks both publicly and throughout healthcare settings in an attempt to protect people from those carrying COVID-19. As the pathogens can be passed on through aerosol transmission this is seeing these masks used in conjunction with safety glasses and face shields which further restrict our ability to communicate non-verbally. For the average female, when wearing a standard N95 with safety glasses, approximately 85% of her face will be covered with either fabric or plastic covering the vital parts of the face used for expression. Although this is protecting the wearer, this is making an already difficult job even harder.

### Impact of PPE on Perception

A study into the effects of wearing surgical masks on speech recognition was carried out after concerns for patient's wellbeing were raised. It was thought there may be poor communication between healthcare professionals in the operating room due to obstructed hearing caused by difficult listening conditions. Subjects completed a Speech Perception in Noise (SPIN) test in order to determine the impact of PPE. From the data recorded, the impact of PPE was statistically significant, with subjects scoring only 20.9% of the testing correct when wearing the surgical mask with the face shield compared to 48.5% without any PPE. This raises significant concerns for patient welfare as miscommunication in these settings can have a detrimental effect on the patients lives if mistakes are made.

With COVID-19, people aged 60+ are most at risk of developing severe or critical illness if infected by the virus. This age bracket is also where hearing loss starts to generally become a reality for people. Already the toll on communication is being observed between healthcare personnel and patients with hearing loss that have the virus, as they are often attending the hospital unaccompanied by family members, may have chronic conditions and are likely to be without hearing assistance. For treatment, the information needs to be communicated completely, accurately, unambiguously and it needs to be certain that it is being understood. A listener comprehension test examined output levels from 6.5ft distance with masks, surgical masks and two types of N95 respirators. From the results, it was found that the mask acted as a low-pass acoustic filter for speech which reduced the high frequencies spoken by the wearer by 3-4 dB with the surgical mask and just under 12dB with an N95. The combination of noise present in environment, speech quality degradation and the absence of non-verbal communication made the speech close to unintelligible for many people.

Another contributing factor as to why sound is an issue in hospitals, in particular operating theaters, comes down to the design and finishing of the building as well as the machinery. Because it needs to be a clean and sterile environment, there are no drapes, carpet, tiles or any other sound absorbing material present. This is in addition to the sounds from machines, monitors and surgical tools being used, causing obstructed hearing through the difficult listening conditions. This sees dB readings generally around 60-65 with this reaching up to 100 dB. This much noise can affect concentration, communication between team members and can lead to mistakes being made putting the patients' health at risk.

A global study of PPE impact on surgical performance during COVID-19 pandemic has been completed which has yielded some concerning findings. In this study surgeons wore a form of mask, goggles and face shield and were asked how they believed their PPE impacted on their sense of protection, visual impairment, decision making process, overall comfort, surgical performance and surgical fatigue. The results found 54% of respondents had issues with communication, 63% experienced visual interference, 66% experienced a decrease in comfort, 82% had an increase in surgical fatigue and 48% found the PPE to influence their decision-making process.

## The Future of PPE in Healthcare

From these studies and bodies of research it is clear that there are issues with the PPE that is being currently worn in healthcare settings. For comprehensive communication, the most essential part that needs to be unobstructed are the areas that are used for non-verbal communication, such as the mouth and the eyes. Masks and safety glasses in addition to face shields are known to impede on our ability to communicate and therefore it is essential to patient safety and well-being, as well as healthcare personnel, to have PPE that supports them and does not make a tough job more difficult. One of the positives of COVID-19 has been the large-scale sample sizes of healthcare personnel using PPE experiencing all the same issues. This anecdotal evidence, along with studies, allows us to generalize these findings across larger populations and create PPE that is going to make a difference. One form of PPE that is being increasingly used are loose-fitting respirators with powered air supply.

A loose-fitting respirator incorporates all the safety features that a mask, safety glasses and face shield have, except they allow for non-verbal communication to exist. Although there is still the plastic shield over the face, the sound is audible and the patient is able to see the movement and expression in the users' mouth and eyes, enabling them to interpret what is being said. Because there is no material directly attached over the users' mouth, there is also less sound being muffled and the user is able to articulate their words more clearly. As the face is fully covered the risk of aerosol transmission is removed, unlike safety glasses where there is still a chance that particles can make their way onto the user's eyes. Because these are positive pressure and loose-fitting, they have a higher assigned protection factor (APF) than both surgical masks and N95s, with this number sitting between 25-1000 when compared to 10. This creates a safer working environment not only for the healthcare personnel but also patients.

As we have seen during this pandemic response, although PPE is designed to protect you, combining different forms has been injuring the wearers. With safety glasses digging into the sides of the user's face and bridges of their noses and masks rubbing on the users' skin, also causing irritation and burn like marking, this has shown how painful PPE can be. Protection needs to be comfortable, not only for the sake of fatigue and physical pain but also for psychological well-being. Those protecting people need to feel safe and supported by their organization and one of the simplest ways is through the PPE they are wearing.

In summary, COVID-19 has fast tracked the change in PPE usage that needs to happen. It is clear that communication is not as simple as talking, and that the way we speak and how our speech is expressed are the true factors that influence what is comprehended in our communication. The current use of masks, safety glasses and face shields not only makes communication harder for the wearer and the patient, but this also puts people at risk of transmission of infection and makes already difficult working conditions even harder.



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