

Benefits of Transparent Masks During Provision of Speech-Language Pathology & Audiology Services

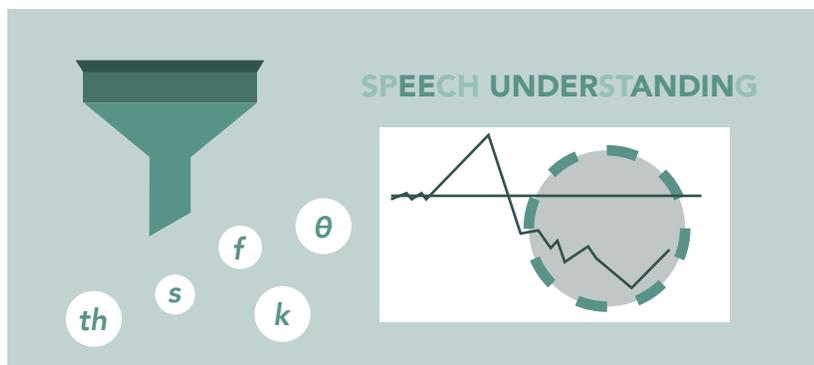
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Despite easing masks restrictions for fully vaccinated individuals, the CDC continues to emphasize the need for healthcare professionals, staff, patients, and visitors to wear masks in all health care facilities.¹ Masks come in many forms including 3-ply surgical, N95 and KN95 respirator, cloth of varying fabric, and transparent with clear panels or windows. While serving an important role in minimizing the spread of the SARS-CoV-2 virus, these products make understanding speech particularly challenging when working with children or with individuals with communication disorders like hearing loss or aphasia. The challenges are exacerbated in the presence of noise and/or increased distance between the listener and the speaker.²⁻³

General Challenges of Masks on Speech Understanding:

All masks, including transparent products with clear panels/windows, noticeably reduce speech loudness and simultaneously degrade speech quality by disproportionately attenuating higher frequency sounds needed for understanding speech. Speech reduction involves frequencies above 1KHz with most of the reduction occurring above 4 KHz.⁴ The degree of high frequency attenuation depends on the type of mask and reportedly ranges from 2.3 dB⁵ to as high as 21.2 dB.²



Corroborated by several studies, transparent exhibit greater attenuation compared to other traditional masks.^{2,4-6} In other words, transparent masks muffle speech more than other face masks and may lend credence to the conclusion that transparent masks may not facilitate effective communication between a health care provider and patient. On the contrary, despite greater acoustic effects on speech signals, transparent masks yield quantifiable benefits over traditional face masks for patients with hearing loss and/or other communication disorders.

Benefits of Transparent Masks:

Preservation of Visual Cues

The provision of both audio and visual cues offers a significant advantage as it helps listeners segment portions of speech better than audio only cues⁷ and recognize speech better in the presence of background noise.⁸ Traditional surgical and cloth masks obscure facial structures including the lips, tongue, and teeth. Loss of visual cues removes the ability for the listener to lipread and visualize facial expressions, both which augment the ability to understand speech. Individuals with hearing loss rely much more on visual speech cues than normal hearing counterparts, particularly when the speech signal is degraded.⁹⁻¹¹ Elimination of visual speech cues degrades speech intelligibility by as much as 20% in the presence of a moderate sensorineural hearing loss.¹² For these reasons, advocates pushed for the CDC to issue guidance on the use of masks with transparent panels for those with hearing loss¹³ although recent studies offer compelling evidence of the benefits of transparent masks over solid masks on speech understanding.



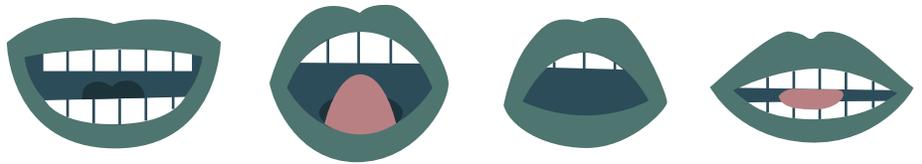
A preliminary study by Yi and colleagues (2021) found that normal hearing listeners correctly identified more words in noise when the speaker wore a transparent mask versus a solid mask.¹⁴ Two other studies included subject groups with hearing loss, yielding similar results. In a comparison study, Atcherson et al (2017) found improved speech understanding performance in noise for two groups of listeners with hearing loss (moderate and severe-to-profound) with a prototype transparent mask over a traditional surgical^f

mask.

More recently, Thibodeau and colleagues (2021) found significantly better recognition of sentences in the presence of background noise with a transparent mask than with a solid mask. Access to visual cues via a transparent mask provides a significant advantage to the listener with normal hearing or hearing loss, yielding significantly better speech recognition accuracy in quiet or noise as compared to solid masks.



Minimal Negative Impact on Delivery of Services



Traditional masks negatively impact the delivery of healthcare services by limiting the ability for some clinicians to execute rehabilitative or habilitative therapies. For example, speech therapy requires speech-language pathologists to provide appropriate cues on proper speech production.¹⁶ Treatment options for individuals with other communication disorders often integrate face-to-face services, whether in-person or remotely, where visual access to the therapist's mouth remains essential. Traditional masks obscure the lower half of a speaker's face by blocking visualization of full facial expressions and all lip movements. Solid masks inherently preclude speech-language pathologists from executing traditional treatment options whereas transparent masks do not.

Increased Patient-Perceived Rapport with Providers



Non-verbal communication in the form of facial expressions represents an important aspect of communication.¹⁷ When asked to rate the difficulty solid face masks impose on communication, individuals reported much greater difficulty understanding, engaging, and connecting with their provider during appointments.¹⁸ Research shows that patients are more likely to report significantly more favorable ratings in situations where the provider wears a transparent or clear mask.¹⁹ In a randomized clinical trial of 200 patients, surgeons were perceived as better communicators when wearing transparent masks compared to covered masks, and rated significantly higher by patients for providing understandable explanations, demonstrating empathy, and building trust.²⁰

Summary of Transparent Mask Benefit:

Transparent masks are specifically designed to preserve access to visual cues, offering the following benefits over solid masks:

- Improved speech understanding in noise for adults with normal hearing¹⁴⁻¹⁵
- Improved speech understanding in noise for adults with hearing loss varying degrees of hearing loss^{2,15}
- Minimized negative impact on delivery of services¹³
- More favorable patient-perceived rapport with a healthcare provider¹⁹
- Significantly higher patient ratings of provider's ability to offer easy-to-understand information¹⁹⁻²⁰
- Significantly higher patient ratings of provider's ability to display empathy¹⁹
- Significantly higher patient ratings of providers ability to build trust.¹⁹⁻²⁰

Conclusion

Despite attenuating high frequency speech sounds the most, transparent masks offer a significant advantage over solid masks. Transparent masks preserve access to a speaker's lips and facial expressions, resulting in quantifiably significant improvements in speech recognition accuracy in both quiet and noise by individuals with either normal hearing or with varying degrees of hearing loss. Furthermore, transparent masks facilitate increased patient-perceived rapport. Providers using transparent masks are rated as better communicators and more trustworthy. Given the communication benefits of transparent masks over solid masks, speech-language pathologists and audiologist should consider donning transparent masks during the delivery of services.

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